# RESEARCH REPORT

## MULTIPLE HOUSING FOR COMMUNITY SUSTAINABILITY

HOUSING AFFORDABILITY AND FINANCE SERIES

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# *MULTIPLE HOUSING FOR COMMUNITY SUSTAINABILITY*

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# EXECUTIVE SUMMARY

## Why Promote Multiple Housing?

The development patterns of our cities have a direct impact on Canada's economic, environmental and social future. Since the 1950s, the Canadian image of an urban ideal has predominantly been one of a detached dwelling in a low-density community purchased at an affordable price relative to the property and dwelling size. Economic, environmental and social costs have placed the sustainability of this pattern of development in question. It is hoped that this study will act as a tool to advocate for responsible urban intensification through the implementation of medium-density housing with improved environmental performance.

Medium density has a range of 12 to 36 household units per acre (30 to 90 units per hectare) (RMOC, 1995) and therefore increases the efficiency of land use by two to five times that of low-density detached households, which are typically about six units per acre (less than 15 units per hectare).

## Increasing the Market Share for Medium-density Housing

This study is based on the proposition that increasing household unit density is a key component in ensuring a more sustainable future. Medium density in urban areas is shown to be capable of responding to consumer aspirations such as a desire for a good place to live. By making better use of land, reducing the demand for new municipal infrastructure, utilizing existing municipal infrastructure more effectively and improving the quality of public institutions and commercial interests that increased densities can support, medium-density housing can contribute to achieving the goal of making our cities more sustainable.

This study addresses the question of sustainability, describing win-win strategies for increasing household unit density. The study identifies household markets that hold the most promise for remaining in, or being attracted to, multiple housing; attributes that are both essential to attracting prospective purchasers and that can be incorporated into medium-density forms; and precedents and prototypical designs which illustrate the attributes deemed critical to satisfying the identified markets.

The winners, or those who stand to benefit from the promotion of a greater market share for medium-density housing, will be:

- the real estate industry, which can profit from a more robust and broadbased market—a significant segment of which is underserved or ignored;
- consumers and communities, who will be offered a broader range of housing options; and
- municipalities, which will enjoy lower infrastructure costs and be able to provide public services and amenities with greater "value added" in terms of economic prosperity and the enjoyment of life for the communities.

The primary question the study seeks to answer is: Can enough people who would normally choose detached low-density dwellings be persuaded to opt for medium-density forms, if these forms incorporate a satisfactory amount of the attributes they seek in a single-family detached house? The goal of the study is to encourage an increased market share of medium-density housing at the expense of lower-density forms.

The research undertaken comprised focus group sessions to determine consumer expectations; a review of current literature to identify appropriate precedents for new medium-density projects;

design studies of potential new forms of medium-density housing and a second set of focus groups to gauge consumer reactions to the precedents selected and to the new prototypes.

Some observations and conclusions that come forward from the research include:

- Townhouses are the most popular or most accepted form of medium-density housing.
- Some of the most prized attributes of a dwelling affecting consumer choice include privacy, security and the character of the community.
- The conflict between cost and perceived value arises from the fact that higher density is perceived by some consumers to be a negative, yet those same households desire quality urban amenities that are only available in denser communities.
- Development charges on a per-unit basis are currently slanted in favour of the detached dwelling. Policy issues, including development charges and municipal taxes will, in the long term, have to be addressed to affect major changes in a move from lower to medium densities.
- Everything can be sold; however, the greatest financial risk lies in the time needed to sell the units. The risk will increase once the initial developments in the area saturate the submarket.

The study identifies existing markets for medium-density housing that should be maintained and strengthened. The study also demonstrates that ignored potential markets exist for multiple housing and provides necessary information for identifying and attracting those markets to medium-density forms. Attracting these markets to medium-density housing will have the greatest impact on altering the physical expansion of our cities. By concluding the study with a blueprint for action, it is hoped that this practical guide will assist in creating a broader range of medium-density housing options that will appeal to existing, potential and ignored markets.

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# 1. INTRODUCTION

## The Relationship between Multiple Housing and Community Sustainability

Low-density residential development results in high land consumption, increased costs for providing infrastructure and reduced opportunities for obtaining a balance of housing options in suburban municipalities. It favours the automobile over other modes of transportation such as walking or public transit. Low-density residential development has been identified as a major contributor to environmental degradation. By contrast, larger scale medium-density developments can make feasible the incorporation of more sophisticated systems for the conservation of energy, water and other natural resources.

This study is based on the proposition that there are significant economic, environmental and social benefits to addressing the negative effects of urban sprawl with attractively designed and well-marketed, medium-density communities. The goal is to encourage an increased market share of medium-density housing at the expense of lower-density forms.

The research for this study followed a four-step process.

- The first objective was to identify, through focus group discussions, a range of housing and neighbourhood characteristics that most accurately reflect consumer preferences using the Regional Municipality of Ottawa-Carleton as the study area. Operating on the premise that many of these patterns or principles apply universally, the results from this study area can be extrapolated to represent other large Canadian cities.

- The findings were used to collect existing precedent-setting housing developments that successfully incorporate the features that have the most direct influence on the decision making of prospective purchasers.[1]

- The attributes identified by the literature, focus groups and the precedents as contributing to successful medium-density housing were then formulated into an architectural program to guide the design process of two prototypical developments, one in an urban and one in a suburban context.

- The final step involved testing the prototypes for consumer satisfaction.

## The Case for Medium-density Housing

In this study, the terms "multiple," "multiple unit" and "medium density" are used at various times and contexts to denote housing with net densities in the order of 12 to 36 units per acre (30 to 90 units per hectare). It takes the form of townhouses, duplexes, stacked townhouses, garden apartments and apartment buildings generally not higher than six storeys. Detached dwellings are typically at densities of three to six units per acre (seven to 15 units per hectare) which means that medium-density development increases the efficiency of land use by two to five times that of low-density detached households. It should be noted that these densities are calculated on an individual project or net basis and do not include public roads or other land uses. On an individual unit basis, the land required to service a unit typically decreases as density increases.

A variety of tenure options is characteristic of medium-density housing, from freehold to rental, condominium ownership, as well as a variety of alternative forms including cohousing and equity and nonequity cooperatives. By virtue of increased efficiencies, medium-density housing

can provide both more affordable housing in desirable urban areas and greater housing options for consumers as their individual households change. Furthermore, increased density creates the population base needed for offering a broader range of public amenities and commercial services within a community. Commensurate with a tighter geographic community are opportunities for greater individual comfort and independence in terms of movement around the community by foot, bicycle, public transportation or car. Therefore, medium density creates greater choice, flexibility and affordability than lower-density developments.

## Creating Choice: Increasing Opportunities for Medium-density Housing

There are strong linkages between the attributes of medium-density housing and trends in society. Canada is experiencing "sea changes" in structure. The shifts arise out of demographic and economic changes. The number of households is increasing, households are becoming smaller and household makeup is broadening dramatically from the traditional model of two parents with children. Additionally, seniors are now tending to maintain independent lifestyles much later in life than ever before. The private sector can develop options to address the needs of these emerging sectors of society, including community structures, modes of transportation and housing.

There is an inherent conflict between, on the one hand, these changing demographic patterns, lifestyle shifts and the high cost to society of low-density suburban development and, on the other hand, the acceptance by North American society of the single-family house as an ideal. In the face of this dichotomy, a fundamental question arises for designers, developers and governments: Can the expectations that homebuyers bring to their home purchasing decisions be met by multiple-unit housing?

In the literature available on this subject and in focus group sessions conducted under this study, housing attributes of primary concern to prospective homebuyers can be identified as follows.

- **Surroundings:** Ambience, privacy and interaction, safety and security, movement, neighbours, housing types, activities and services, ecology and the environment.
- **Immediate territory:** Privacy, usefulness of outdoor spaces, ease of access to and from the unit.
- **Dwelling unit:** Size, layouts, environmental impact, tenure and control, individuality, status.

The challenge for designers and developers is to develop innovative medium-density housing that meets consumer expectations and contributes toward community sustainability. In addition, targeting markets with good potential of being attracted to such innovative projects that better meet consumer demands can enhance the likelihood of being economically successful with these projects in the housing marketplace. The intention of this study is to provide the housing development industry with principles and guidelines for the design of medium-density housing that can be put into practice immediately.

# 2. MARKETS FOR MEDIUM-DENSITY HOUSING

Consumer markets can be grouped into four household types:

- couples with children;
- lone parents;
- couples without children; and
- non-families.

This study shows that each household type forms a sizeable market for medium-density housing (Table 1 and Figure 1). The distribution of dwelling type choices within each consumer group shows that the markets for medium density are broadbased. In the study area of Ottawa-Carleton, for example, 35 per cent of couples with children live in medium-density forms.

As a result of the existence of markets for medium-density housing, the housing industry has the option of including any or all of these groups in its marketing initiatives. However, consumer demand projections based on 1991 census data for the Ottawa region and StatsCan projections (Skaburskis, 1996) indicate that market share for medium- and higher-density housing will increase only moderately over the next 20 years, assuming that housing prices and incomes remain in balance. Thus, despite the expected increase in the number of households (which will, on average, decrease in size), the demand for detached dwellings will continue to exert pressure on the spread of cities. To ease that pressure, it is necessary to explore new markets for medium-density housing and to imbue medium-density developments with attributes that will appeal to a wider variety of household types.

To identify potential new markets for medium-density forms, the following analysis (Skaburskis, 1996) examines prospective markets for medium-density housing and presents:

- a description of characteristics which distinguish purchasers of lower-density housing from medium-density buyers;
- an analysis of attributes in which medium-density housing currently fails to meet consumer expectations;
- a description of the attributes that will make medium-density housing more attractive to consumers; and
- profiles of target groups that present the greatest potential for maintaining and increasing the market share for medium-density housing.

## The Characteristics of Markets for Medium-density Housing

The relative importance of the factors distinguishing the demand for lower-density and medium-density housing can be assessed by looking simultaneously at the set of household and housing characteristics. These characteristics (explained in more detail below) quantify, all other factors being equal, the likelihood that a household with the stated characteristics will buy a single-family dwelling or medium-density housing, such as a townhouse or duplex. The townhouse form has been chosen for this analysis because it proves to be the most popular form of medium-density housing.

Table 1: Propensity to buy a single-family house vs. attached housing by household characteristics

| Household Type | Factor |
|---|---|
| 1. Couples with children | 2.29 times |
| 2. Maintainer's age | 1.26 times |
| 3. Household income | 1.03 times |
| 4. Recent buyers who have moved in last five years | 0.58 times |
| 5. Couples without children | 1.74 times |
| 6. Female maintainers | 0.77 times |
| 7. Recent immigrants | 0.49 times |

Note:
The ratio states how many times a household with the listed characteristics is likely to purchase a single-family house to a townhouse, duplex or other type of attached dwelling.

Source:
Skaburskis, 1997, pp. 21-28.

## Descriptions of Household Types

### 1. Couples with children

The presence of children in a household most strongly distinguishes the buyer's preference for a single-family house over a higher-density form of housing. If all other household characteristics remain the same, this household is 2.29 times more likely to live in a detached dwelling rather than a medium-density development. The findings of the study indicate a challenge in meeting the needs and expectations of this household type in the design of medium-density housing.

### 2. Maintainer's age

Older households are more likely to select a single-family dwelling. For each 10-year increase in the age of the household's primary maintainer, the odds of living in a single-family house increase by a factor of 1.26. If, for example, when the primary maintainer was 35 years of age, a household had a 50 per cent chance of living in a duplex or townhouse, then the chance that the household would remain there rather than live in a single-family house 10 years later, holding income and all other factors constant, would be 44.2 per cent. The effect of age is largely the result of its likely contribution to the household's wealth. Older households have had more time to build equity and trade up in the housing market. The aging of the population will mean that more households will have the down payment for a single-family house. In addition, it has been observed that retired people tend to select single-family homes slightly more often than others even after the effect of their age has been controlled for. Though the chances decrease with age, there is still a proportion of older maintainers who can be attracted to townhouses and other forms of semi-attached housing if those forms are successful in providing design attributes desirable to these consumers, which may differ in certain respects from the needs of other household types.

### 3. Household Income

Each $5,000 increase in annual household income increases the odds that the household is in a detached house by a factor of 1.03. For instance, if a household with a certain profile had a 50 per cent chance of living in a townhouse, then the same household but with $5,000 more in annual income would have a 49 per cent chance of being in a townhouse. It was shown that townhouses attract people from all income brackets.

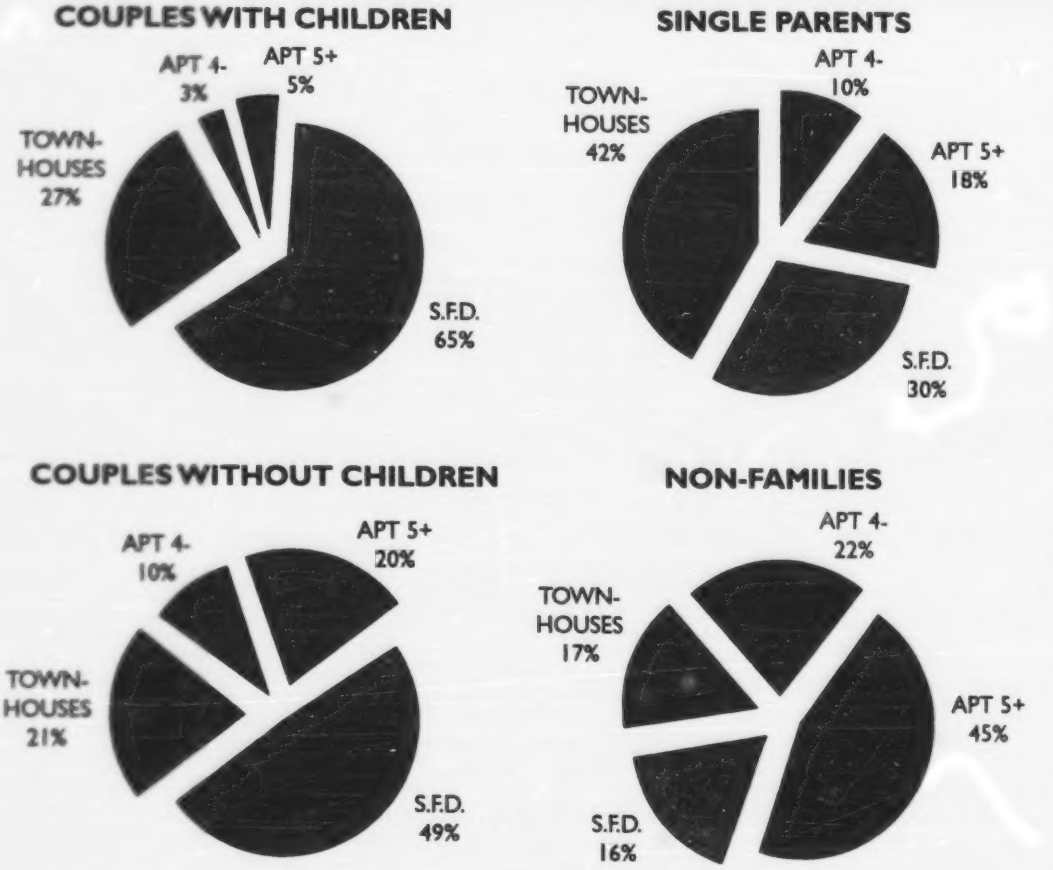
### 4. Recent buyers who have moved in the last five years

Occupants of townhouses have moved more often in the last five years than occupants of single-family detached houses. All other conditions being equal, a household that moved between 1992 and 1997 is almost twice as likely to have bought a townhouse rather than a detached house. For example, if a household living in the same unit for more than five years had a 50 per cent chance of occupying a townhouse, then a similar household that had moved within the last five years would have a 63.3 per cent chance. This situation is in large measure a result of the relatively recent increase in the market share of townhouses within the homeownership market. The increase in supply itself is a reflection of developers' assessments of current market conditions. Uncertainty with regard to employment stability increased the proportion of households who opted to enter the homeownership market by buying a townhouse.

**5. Couples without children**

Couples without children who may be planning to have children or couples who may be staying in their home as empty nesters, tend to occupy single-family houses. If all other household characteristics remain the same, these households are 1.74 times more likely to occupy a detached dwelling than a higher-density form of housing. When a homeowner without a family gets married, the chance that the new household will remain in a medium-density form of housing drops from 50 to 36.5 per cent. This change is even greater with the addition of a child. From a marketing perspective, this household type is an excellent one to seek to attract to medium-density housing because the family situation is more flexible than for couples who already have children.

Figure 1:
Dwelling types by household types




Note:
"Apt 4- denotes apartments less than four storeys tall, "Apt 5+" refers to apartments greater than five storeys and "S.F.D." stands for single-family dwelling.

Source: Skaburskis, 1997, pp. 4-5.

**6. Female maintainers**
Female primary maintainers tend to favour medium-density forms. The odds that they will select a detached house over a medium-density option are 0.74 of men with similar characteristics. If a household with a male primary maintainer had a 50 per cent chance of living in a duplex or townhouse, then the similar household but with a female primary maintainer would have a 56.4 per cent chance. As more women become primary maintainers, it is anticipated that this change in society will help fuel the demand for medium-density forms.

**7. Recent immigrants**
Recent immigrants are more likely to buy medium-density housing than single-family dwellings. However, it was found that over time, immigrants occupy single-family houses along the patterns of the general population, indicating that the difference may be due to an initial lack of wealth and language or cultural barriers. This trend may be explained by the perception held by many that the ownership of a single-family home is a sign of having "made it"; of having established oneself economically. A shift in cultural values will gradually encourage the acceptance of medium-density forms as acceptable longterm housing options.

Figure 1 illustrates the distribution of building types across characteristic households in the Ottawa region by analyzing the 1991 Census Public Use Micro Data Files (PUMF). The research indicates that most couples with children occupy single-family dwellings while roughly equal numbers of couples without children occupy single-family dwellings and various forms of medium-density housing. Couples with and without children tend to have the highest income, which partly explains their greater tendency to occupy single-family houses. Lone parents, however, opt to live in townhouses more often than any other housing form while almost half of non-family households most often select apartment buildings with five storeys or more. One encouraging finding is that the townhouse form of medium-density housing is popular among the range of household types and incomes.

Two conclusions to draw from these observations are that higher incomes are associated with a move away from apartment options toward the occupation of single-family houses and the presence of children is a major factor in deciding the type of place in which a household will choose to live. Demographic changes will, therefore, have an impact on the demand for different housing types.

A challenging approach to the goal of making cities more compact involves developing designs for multiple housing that are attractive both to first-time and moveup homebuyers who have threshold household incomes that allow them to contemplate purchasing single-family dwellings. In the Ottawa area, this annual income level is between $55,000 and $65,000 in 1997 dollars.

An analysis of the ranked factors distinguishing the submarkets formed by different household types can identify the characteristics of households that are the easiest to draw to higher densities, namely those ranked around 1.0 times or less. These households form the lowest-risk profiles for developers to target in marketing townhouses. However, the research also shows that medium-density housing options appeal to a wide variety of households, including those at all income levels.

In general, projects of all types can be successfully marketed, over the long run. The financial risk is manifested in the time required to sell the units. This risk is reduced by building innovative projects that appeal to specific submarkets.

## Where Medium-density Housing Fails to Meet Consumer Expectations

A perplexing contradiction emerged from the study. As a general term, "density" is perceived to be a "negative," either as a result of past experience or through the acceptance of stereotypes which perpetuate and encourage the tendency for households to prefer lower densities, even with all other factors being equal. Yet qualities of urban areas, such as vibrant communities, proximity and easy pedestrian or vehicular access to public amenities, cultural variety, short commuting times to work and shopping (all of which *depend* on higher densities) are perceived to be "positives." Households are forced to make tradeoffs between the perceived "negatives" of higher density and the "positives" of its benefits.

For households with characteristics that favour single-family housing, medium-density housing fails to meet their expectations, primarily at the level of the individual dwelling unit rather than due to the immediate territory or the greater surroundings. The positive value of the surroundings or of a richer community resulting from increased density is not a sufficient tradeoff for housing attributes of low-density housing such as:

- freehold ownership;
- larger private outdoor space;
- ease of access and egress from the dwelling to the street (and car);
- physical and acoustic separation from neighbours;
- larger size of the dwelling unit;
- greater number of rooms; and
- the opportunity for individual expression.

For some, the failure of medium-density housing in meeting consumer expectations can be summarized as a perception of a "less of" or a "loss of" privacy, physical space, convenience and the sense of independence or control.

The initial cost of the dwelling (purchase price in contrast to operating costs) is also a significant factor in meeting consumer expectations. It is clear that consumers view tradeoffs to a great extent in terms of value for their investment. The cost of a single-family dwelling on a dollar per square metre basis is often similar to, or less than, townhouses or higher-density forms, because the purchase price primarily reflects the hard construction costs of the dwelling. The "affordability" of townhouses is often a result of their smaller size and, therefore, when a consumer is comparing the actual unit to be purchased with other options, the purchase price of the townhouse is lower.

For the average consumer, "purchase price" is a misleading figure as development charges and municipal tax structures do not represent the true capital and operating costs of servicing the development of lower-density suburbs (such as the cost of highway construction, regional servicing, etc.). If these costs were fairly represented in the development charges levied against low-density suburban dwellings, the economic balance in purchase price could be tilted dramatically in favour of higher-density urban development. A shift in public policy, and not necessarily demographic changes or design, has the greatest potential to affect the future of urban development (Skaburskis, 1997).

## Attributes that make Medium-density Housing Attractive to Consumers

Even under the current structure of development charges,[2] there are opportunities to incorporate attributes that can make medium-density options more attractive to targeted consumer markets. Desirable design attributes typically associated with detached housing can be incorporated into multiple housing forms. The attributes listed in this section are based on the concerns, preferences and positive impressions expressed by housing consumer target groups (Leung, 1996, 1997). Addressing these attributes in the design of medium-density housing is key to meeting consumer expectations.

Responses from focus groups and a review of relevant literature on the attributes of housing are organized under the three general headings of "The Surroundings" (meaning the neighbourhood or community), "The Immediate Territory" (the specific development) and "The Dwelling Unit." The list of desirable attributes is the basis for a hierarchy of priorities for new projects at three different levels of detail. Similarly, these attributes can also be used to better understand the reasons for the success of precedents to which designers and developers can refer in designing new projects.

### The surroundings

*Ambience*

- variety of building forms and architectural detail;
- a feeling of permanence, an established neighbourhood;
- a feeling of spaciousness (not feeling crowded);
- sufficient open space to provide for year-round sunlight and use;
- natural lighting maximized from windows and skylights; and
- views, air and natural light (improve "ambience" of unit).

*Privacy and interaction*

- clear delineation between residential and non-residential uses;
- privacy between neighbours (visual, physical and acoustic);
- variety of paths through the community with opportunities for interaction, (but not forced);
- common courtyards; and
- common amenities.

*Safety/security*

- vehicular routes separated from pedestrian areas;
- no blind corners;
- porches, courtyards, streets with houses facing each other (perceived to increase safety);
- good visibility to grade and street (considered important for security);
- well-maintained community parks; and
- architectural features such as gates.

*Movement*

- availability of convenient transit to meet daily needs;
- bus routes (seen as environmentally desirable); and
- Seven-to eight-minute walk to desired amenities.

*Mix of neighbours*

- good neighbours (one of the most important attributes of a good community and safe neighbourhood);
- no absentee ownership (perceived as a "negative");
- similar levels of household incomes, compatibility of lifestyles; and
- mix of household types and residents in different stages of life.

*Mix of housing types*

- non-repetitive building types;
- scale of the development compatible with surrounding community;
- a mix of housing types (perceived to support a mix of age groups); and
- well-kept property.

*Activities and services*

- participation in neighbourhood affairs (enhances a sense of community);

- listed in order of importance, the community activities and services considered necessary and should be available within a five-to seven-minute walk, are:
  - grocery or convenience store,
  - public transportation,
  - proximity to places of work (deemed extremely desirable but unlikely),
  - good schools,
  - children's playgrounds and common outdoor areas and
  - child care.

*Ecology and environment*
- more efficient building systems (believed to do less damage to the environment and perceived to lower operational costs);
- use of natural topography and vegetation (avoid impression that land was "decimated" to construct the community);
- measures to limit air pollution (an important community concern); and
- public transportation.

**The immediate territory**

*Privacy of outdoor space*
- backyards are preferred form of private outdoor space;
- front yards are perceived to enhance opportunities for socializing and child supervision; and
- agreements for sharing maintenance responsibilities of outdoor spaces.

*Use of outdoor space*
- parking spaces clearly designated;
- loading/unloading areas close to access doors or elevators;
- designs to take advantage of the sun (create protected "sun traps");
- private yards (especially as created by U-shaped or C-shaped buildings, useful for watching children);
- front porches (encourage neighbourliness and enhance safety of street); and
- boundaries to distinguish between public and private spaces (such as fences, hedges, etc.).

*Individuality*
- control of territory immediately adjacent to dwelling unit;
- self-expression (enhances sense of control and "ownership" and improves shared spaces);
- no forced socialization; and
- architectural standards (rules of the community) established and maintained.

*Movement to and from the unit*
- direct entrance at grade (especially for households with children); and
- minimize the distance between parking and dwelling unit.

**The dwelling unit**

*Size*
- desirable size of family home averages about 167 $m^2$;
- three bedrooms are a minimum for a family dwelling (four bedrooms preferred);
- large kitchens;
- bathrooms large enough to accommodate a child and a parent at the same time;
- porches (perceived to make home "look" larger); and
- generous vestibules (perceived to make home "look" larger).

*Layouts*
- larger rooms (preferred over greater number of smaller rooms);
- separate and secure entrances for each unit;
- main floor laundry (alternatively, should be located next to the master bedroom, or a laundry chute provided);
- sight lines through the unit and to the exterior, especially from the kitchen;
- more than one entrance to the dwelling;
- eat-in kitchens (preferred over cooking areas only); and
- a bathroom or powder room at the entrance, especially for households with small children.

*Adaptability*
- flexibility to renovate or to convert spaces, rooms and parts of rooms to alternative uses;
- adequate well-located electrical and telephone outlets (for modems, appliances, etc.);

- flexibility, including design features (such as separate entrances) and construction elements (such as walls that can be taken down or put up); and
- space adaptable to work areas, office space, and apartment (important for niche marketing).

*Movement*

- proximity between the unit entrance and the kitchen (reduces the distance that groceries need to be carried);
- efficient use of space;
- reduced corridors;
- no blind corners;
- non-slip floor surfaces; and
- units on one floor (preferred over multiple-storey dwellings).

*Storage, services and maintenance*

- design and materials that allow for easy and low maintenance;
- hardwood floors (perceived to be low maintenance and attractive in appearance);
- well-organized and useful storage space; and
- well-placed storage spaces (e.g., near entrances).

*Tenure and control*

**Privacy**

- separation of functions within the unit (e.g., privacy from one's children);
- right to convert spaces and right to keep pets within the unit;
- private backyards with vegetable gardens (preferred over shared garden plots and private terraces);
- purchasing own tools and working within the dwelling unit (preferred over communally operated and equipped hobby or workshop areas);
- minimized noise transmission between floors and across party walls;
- minimized transmissions of smells (especially cooking odours); and
- front porches and front gardens (perceived as allowing for socializing, yet providing for privacy).

**Safety**

- smaller clusters of dwellings sharing lobbies, corridors, mailrooms, etc. (increase sense of safety and familiarity among residents);
- quality lighting, access to daylight and good signage in parking areas;
- centralized alarm systems and voice access from the lobby area; and
- safety features that consider household chores, such as cleaning windows and accessing cupboards.

**Control and management**

- permission to work out of one's dwelling;
- maintenance contract (perceived as effective way to deal with concerns about control and management of shared areas and facilities); and
- clearly demarcated private spaces outside of unit (e.g., fences).

*Ownership*

- freehold ownership (preferred over condominiums and rentals due to concerns about shared spaces, facilities and the potential for rising fees);
- ownership (perceived to be synonymous with safety, good neighbours and well-kept properties);
- treatment of shared spaces, facilities (especially restricted access); and
- minimized excessive regulation (perceived to reduce the advantages of ownership—"no different than rental").

*Environmental concerns*

- healthy environments, including indoor air quality;
- access to the outdoors for children;
- energy efficiency (must result, and be seen to result, in savings in operating costs);
- convenient composting and garbage sorting for recycling;
- higher initial costs and lower operating/ maintenance costs (preferred over lower capital costs and higher operating costs);
- "cost saving" and "hassle-free" environmental features; and
- materials that collect less dust (e.g., hardwood floors instead of carpeting).

## The Potential for Increasing Market Share

Three household profiles have been developed to illustrate the characteristics of potential markets to which innovative and well-designed medium-density projects can be targeted. The two distinguishing features among the three profiles are:

- the level of financial risk inherent in marketing the project to each group; and
- the potential impact that the success of such projects can make toward the goal of making cities more compact.

The three groups, for the purpose of this study, are described as low risk/benefit, status quo and high risk/benefit. Note that "low benefit" means that a large proportion of this group, under current conditions, are expected to choose medium-density forms and, therefore, will not significantly increase total housing market share. The greatest potential for increasing market share is found in the high risk/benefit group because, under current conditions, these households are most likely to remain in single-family dwellings. This situation is partly due to the scarcity of attractive alternate housing forms and partly as a result of predominant societal norms.

One concern in development risk is the potential for an earlier than expected saturation of a submarket, which could lead to longer than anticipated absorption times. However, no single project needs to target a single market and developments aimed at combinations of all three profile groups can mitigate financial risk. Townhouses, for example, have a broad base of support from all household types from which to generate sales. If the project combines townhouses with other housing types in a market-determined mix, it stands a better chance of attracting a broad range of household types.

**Household profile 1: low risk/benefit**
Many of these households are not living in medium-density forms but, as a result of their characteristics, are the most likely to be attracted to medium-density forms with minimal marketing risk. Examples of low risk/benefit profile households would be those of female maintainers and recent immigrants. While these characteristic households appear to be the most inclined toward choosing medium-density forms, they should not be the only ones targeted.

**Household profile 2: status quo**
This group represents households currently living in medium-density forms. The status quo household profile is presumably satisfied with this form and is likely to remain there if there are no changes in the nature of available options, the price of medium-density housing and the price of single-family alternatives. Although this group presents the least challenge in terms of marketing or changing urban densities, targeting this group for part of the absorption of new projects can assist in lowering the risk of a new venture. The lone-parent household is an example of a status quo profile.

**Household profile 3: high risk/benefit**
This group poses the greatest challenge, since it represents households that have the option and the means of buying a single-family detached dwelling. While households earning less than $70,000 a year buy single-family houses in the Ottawa region, the statistical analysis shows that the tendency to buy single-family houses increases in a pronounced way after the household's income rises above $70,000. Households earning between $70,000 and $90,000 present a realistic challenge for the developers of medium-density housing who want to expand their market share.

Since developers building for this income group will, at times, be breaking new ground, the profile presents the highest risk market. It is also the one that offers the highest benefit (by luring this market away from low density) if the project is successful. In the Ottawa region, this group is primarily represented by households with incomes between $55,000 and $65,000 in 1997 dollars. An example of this type of household is a couple with preschool children who are about to purchase their first house. The three household profiles are described in greater detail in Table 2. The information in Table 2 presents developers of medium-density housing with profiles of possible market segments. The profiles can be used in setting building programs, in establishing design guidelines and in developing marketing strategies.

Table 2:
Low risk/benefit, status quo and high risk/benefit characteristics

| | Low Risk | Status Quo | High Risk |
|---|---|---|---|
| **Household Type Distribution by Household Profile (%)** | | | |
| Non-family households | 47 | 34 | 10 |
| Couples under 45—no children | 11 | 10 | 13 |
| Preschool children present | 9 | 12 | 18 |
| School-age children present | 16 | 23 | 40 |
| Couples 45-64—no children | 2 | 4 | 9 |
| Over 66 | 15 | 17 | 11 |
| Total * | 100 | 100 | 100 |
| **Income Distribution by Household Profile (%) in 1997 dollars** | | | |
| $0 - $19,999 | 30 | 20 | 0 |
| $20,000 - $29,999 | 18 | 13 | 0 |
| $30,000 - $49,999 | 32 | 26 | 0 |
| $50,000 - $69,999 | 14 | 19 | 0 |
| $70,000 - $89,999 | 4 | 11 | 100 |
| $90,000 and over | 2 | 11 | 0 |
| Total | 100 | 100 | 100 |
| **Occupancy of Current Building Types by Household Profile (%)** | | | |
| Single detached | 12 | 0 | 60 |
| Attached/duplex/row | 23 | 42 | 28 |
| Apartment - 4 storeys or under | 22 | 20 | 5 |
| Apartment - 5 storeys or more | 43 | 38 | 9 |
| Total | 100 | 100 | 100 |
| **Current Tenure and City Location of Households (%)** | | | |
| Per cent owners | 20 | 27 | 75 |
| Per cent central city | 82 | 65 | 39 |
| **Proportion of Female and Lone-Parent Households by Target Groups (%)** | | | |
| Female lead households | 56 | 45 | 24 |
| Lone-parent | 12 | 12 | 6 |
| **Average Estimated Price ($1,000) of Owner-occupied Dwellings by Building Type** | | | |
| Single detached | 198 | N/A | 207 |
| Attached/duplex/row | 142 | 153 | 154 |
| Apartment - 4 storeys or under | 154 | 175 | 199 |
| Apartment - 5 storeys or more | 132 | 148 | 166 |
| **Average Rents by Building Type** | | | |
| Single detached | 830 | N/A | 1,165 |
| Attached/duplex/row | 739 | 802 | 898 |
| Apartment - 4 storeys or under | 624 | 634 | 788 |
| Apartment - 5 storeys or more | 611 | 645 | 808 |

Table 2, based on 1991 Census Data for Ottawa-Carleton, describes the profile of households that a developer may want to attract to new medium-density housing projects. The profiles differ in several ways such as: 1) the degree of financial risk that a developer can expect to experience and 2) the degree of benefit attracting a particular household group will have on making cities more compact. The profiles also indicated where there is potential for opening up new markets.

Note:
* May not add up to 100 per cent due to rounding.

## The forms of medium-density housing

Figure 2:
Castle Hill, Toronto Ontario

A curved wall provides the neighbourhood with a sense of enclosure. Porches, front steps and grade separations add to the privacy of the units.

Source:
Gabor and Popper Architects.

Figure 3:
Rosegarden Mews, Toronto Ontario

The separation of vehicular movement, activities and pedestrians is accomplished on this site through the buildings' relationship to the street and the design of public and private landscaped areas.

Source:
Canadian Architect,
March 1983.

# 3. THE FORMS OF MEDIUM-DENSITY HOUSING

Medium-density housing comes in many forms, and there are many different ways of assembling and arranging dwelling units. The most common forms are:

- the townhouse,
- the stacked townhouse,
- the garden apartment
- the mid-rise apartment.

Each housing form has inherent attributes that can be attractive to prospective purchasers. Some forms (e.g., townhouses) offer a wider range of attractive attributes (Fig. 2 and 3), while others (e.g., mid-rise apartments) may have to rely more heavily on tradeoffs to improve marketability. The following precedents, identified through our research, illustrate a variety of built medium-density housing projects exhibiting desirable design attributes that are attractive to consumer focus groups.

## The Townhouse

Townhouses are dwellings typically attached on both sides that can be held in freehold or condominium form. They can be built at a density of 12 to 36 units per acre (30 to 90 units per hectare) and can have private yards fronting a street.

### The surroundings

*Ambience*

Townhouses create continuous walls, which provide a sense of enclosure, give form to the street and can create a distinct character for the neighbourhood.

*Privacy and interaction*

Townhouses can offer private backyard areas sheltered from the street. Porches, front steps and fences (as well as grade separations) can mediate between the dwelling and the street, such as in Castle Hill (see Figure 2). Special care in design and construction is necessary to minimize transmission of noise through party walls.

*Security*

Except in larger developments, pedestrian and vehicular traffic generally follow the same path. Security is improved by having all dwellings fronting the street to monitor activities and movement. This is further enhanced when high activity areas, such as kitchens, are at the front of the units. Placing the garage in front compromises this connection to the street. Therefore, whenever possible, parking should be placed at the rear of the unit. When this is not possible, parking should be located underneath (in a common underground structure or individual garage) in a way that maintains the important view of the street.

Figure 4:
Golden Gate Commons, San Francisco, California

The townhouse units range from one to three bedrooms and nearly all provide private outdoor space.

Separated from street noise, the townhouses in this low-rise development sit on a raised podium that provides parking in the centre and conveniences, such as street-accessed retail, around the perimeter.

Source:
Architectural Record, 1981.

*Mix of housing types*
Townhouses can range from single-storey bungalows (for seniors) to three-storey luxury residences, but typically, only a limited number of dwelling unit types will be provided within a single development. To maximize the chances for success in marketing and to attract a larger market of purchasers, as broad a spectrum of unit types and sizes should be included in the development as feasible. This can be done by grouping different types of buildings on the same site (see Figures 4 and 5) or combining different types of units in one building (see Figures 16 and 17).

*Activities and services*
Townhouse developments can create semipublic courtyards for more secure children's play areas (see Figures 4 and 5). The increased densities that result from townhouses increase the viability of public transit.

**The immediate territory**
Through organization and massing, townhomes create clear separations between public and private areas which minimize unwanted overlook, interaction and disturbance. Rows of townhouses create physical barriers between the fronts and rears of the units and, as a result, most of the dwellings are oriented toward public spaces or their own private outdoor space.

**The dwelling unit**
*Size*
The townhouse can be built economically (typically wood-frame construction with basements that are not fully below grade to reduce excavation costs) to provide more interior space at reasonable cost.

*Layout*
Townhouses typically allow principal rooms access to natural light (except those interior to the unit such as bathrooms and kitchens). Clear sight lines through the unit and to the outdoors create a sense of openness and light within the unit and aid in child supervision. Vertical and horizontal separation of functions allows for greater privacy within the unit between sleeping and living areas. Large open rooms and L-shaped spaces provide flexibility for furnishing the units and designating uses.

*Tenure and control*
In either freehold or condominium form, the townhouse offers residents as much control as a detached dwelling.

## The Stacked Townhouse

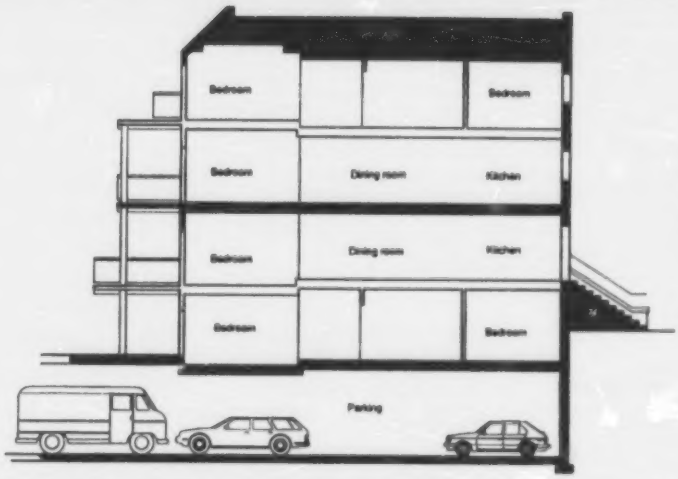
Stacked townhouse describes individual dwellings attached on both sides and stacked one above the other to a density of 20 to 80 units per acre (50 to 200 units per hectare). Both freehold and condominium tenure are possible, though the latter is far more common. Stacked townhouses usually front a street and offer front or rear outdoor areas in the form of patios for lower units or balconies for upper units, such as the Copperfield in Toronto, Canada (see Figure 5).

Figure 5:
Copperfield, Toronto, Ontario

The traditional appearance of this development creates an inviting streetscape and low-rise scale. The narrow, tall, Victorian-style facades complement the architecture of the surrounding neighbourhood, while increasing density. Connection to the stable residential community adjacent to the site was a significant marketing point.

Source:
Quadrangle Architects Ltd.

Figure 6:
Copperfield, Toronto, Ontario




The living areas of these stacked units are grouped to increase the separation and level of privacy of the sleeping areas.

Source:
Quadrangle Architects Ltd.

Figure 7:
Forest Ridge and Colonial Terrace, Mississauga, Ontario

Units are arranged to form an informal courtyard that enhances security and amenity.

Source:
Quadrangle Architects Ltd.

**The surroundings**

*Ambience*

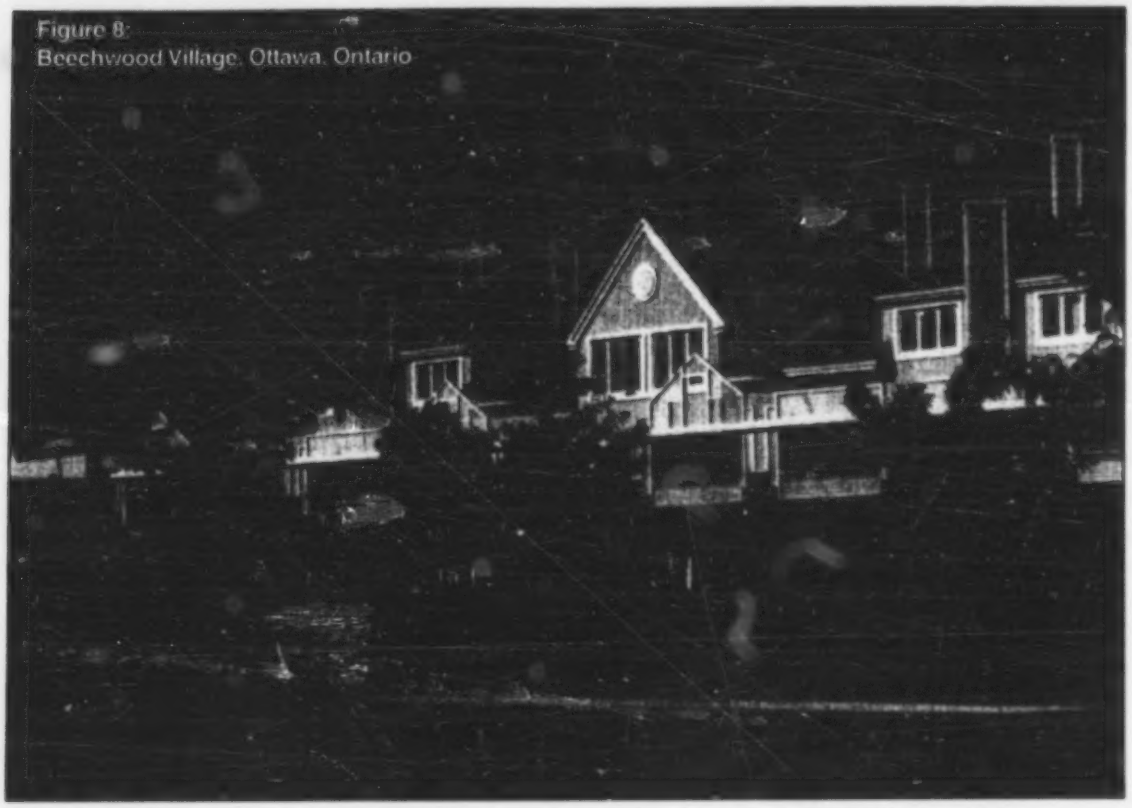
Stacked townhouses, because of their height (usually up to four storeys), can fit into existing low-scale neighbourhoods without altering their character. In new developments, stacked townhouses create urban streetscapes and higher densities in forms that are still lowrise in scale. Cars are usually parked underground, which eliminates parking areas from view and frees the area immediately around the dwelling for pedestrians. In situations where underground parking is unfeasible physically or financially, shared surface facilities can be provided. Covering the surface parking with a deck can create a raised patio or courtyard. The stacked townhouse units can be oriented toward the street or toward internal private areas.

*Privacy and interaction*

Stacked townhouses can offer relatively private areas at the rear, which are sheltered from the street to satisfy the consumer desire for private outdoor space. Lower units often have an outdoor patio or yard at or near grade, while upper units will usually have a balcony or terrace, as at Copperfield. Porches and front stoops can form a transition zone between dwelling entrances and the street (see Figure 2). Special care is required in detailing and construction to minimize the transmission of noise between units through walls and floors.

*Security*

All units face the public areas of the site and have direct connections to grade, offering good "eyes-on-the-street" security. The dwellings can also be sited in configurations which provide semi-private and secure courtyards (see Figure 7). Below-grade




Given that outdoor space is a significant factor for consumers in choosing a home, a selling feature of this development is the fact that each unit is provided with a generous terrace, either at grade or above.

Source:
Barry J. Hobin and Associates.

parking structures may require electronic surveillance in addition, or in lieu of, the security provided from overlook and natural light.

*Mix of housing types*
The stacked townhouse form can accommodate a range of unit sizes and layouts from single-storey, one-bedrooms up to three-storey, three-bedroom units. The most common of these is a two-storey, two-bedroom suite, which responds to the requirements of the largest segment of the market.

*Activities and services*
Stacked townhouse developments can incorporate semi-public courtyards for more secure children's play areas. Increased densities contribute to the potential for nearby connections to transit and services, bringing these amenities closer to residents. In some cases, it is the increased densities that attract transit services. Alternatively, the provision of transit infrastructure justifies the increased densities.

**The immediate territory**
Stacked townhouses typically place public and private areas on opposite sides of the dwelling. Outdoor areas can be provided with a reasonable level of privacy; however, overlook from upper to lower units can be a concern.

**The dwelling unit**

*Size*

The stacked townhouse can be constructed economically while still providing direct access to grade for each unit, because land costs are spread among more units. Unit sizes are usually smaller, to reflect the needs and budget of the potential market, typically, 95 to 130 m² for a two-bedroom, two-storey unit. The size of units is limited by the height allowed under building code provisions for lowrise structures and by the requirements for access to both units from grade. This limitation can be mitigated by increasing bay widths and combining unit modules—measures which allow size to vary.

*Layout*

Interior layouts are determined and affected by the provisions for direct access to grade and the limited exposures. However, depending on the width of the unit, the layout can allow for a vertical separation of living and bedroom areas of the dwelling. This separation is a desirable feature for many household profiles, including families with children and live-work arrangements.

*Tenure and control*

The stacked townhouse typically offers condominium tenure, which allows greater flexibility inside the unit but only limited individual control on the exterior. Since the opportunity for individuality is deemed to be a selling feature, allowing for self-expression at the interior of the dwelling unit can make limitations on changes to the exterior more acceptable.

## The Garden Apartment

Garden apartments are lowrise (three- to four-storey) apartment buildings, typically of wood-frame construction, that are either walkups or are equipped with elevators. Like the stacked townhouse, garden apartments can be built to a density of 20 to 80 units per acre (50 to 200 units per hectare). Unlike stacked townhouses, units are usually on a single level and do not offer direct access to grade. Rather, access is typically via a shared entrance, lobby, and stairs or elevators. They often feature open space around them, which is an attribute that attracts consumers.

**The surroundings**

*Ambience*

Garden apartments can be designed to create the image of large estate homes (see Figure 9). Their lowrise designs maintain an intimate residential scale. They can be sited in clusters to increase the amount of public or semi-public areas at grade available for landscaping.

*Privacy and interaction*

Apartments can be provided with outdoor terraces or balconies, and those units at grade have patios and often enjoy direct access to larger landscaped areas. Overlook from upper to lower units is a concern, which may be mitigated by providing cover for lower-level private outdoor areas (see Figure 11).

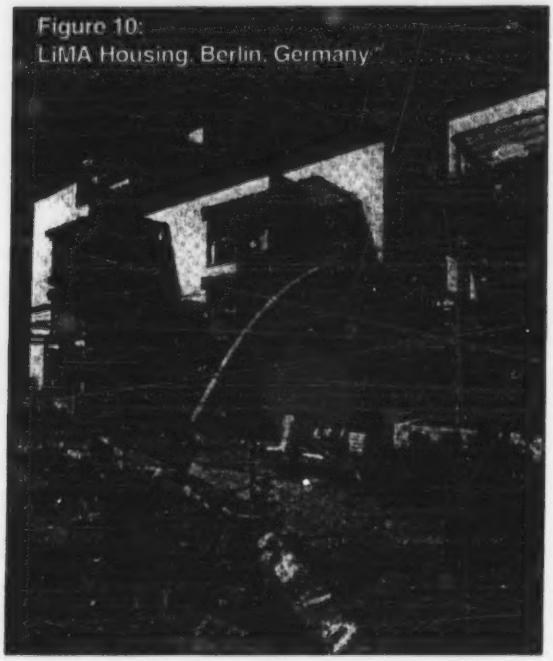
Figure 9:
Governors Gate, Ottawa, Ontario

Extensive landscaping gives this development a suburban character, and the detailing is evocative of large "estate" houses.

Source:
Regional Municipality of Ottawa-Carleton, Understanding Residential Density.

*Security*
Secure access can be provided through electronic surveillance and standard apartment entrance devices. Buildings can also be designed and sited to create defined semi-public spaces within the development. The small scale of the buildings encourages but does not force interaction, familiarity and recognition among the residents which contributes to the making of a safe neighbourhood.

Figure 10:
LiMA Housing, Berlin, Germany



This courtyard provides a private, shared outdoor area for residents and their children in an urban setting.

Source:
Laura Johnson, Housing the New Family.

*Mix of housing types*
Apartments are typically on one level, with a limited number of unit types and sizes offered in each building. This may limit the range of prospective household types that would be attracted to this form of medium-density housing.

*Activities and services*
Garden apartments can achieve densities that are equal to or higher than other medium-density forms. When such apartments are located along major streets or in urban centres, the increased densities contribute to the viability of public transit and local retail and service establishments. Alternatively, locating such developments in close proximity to transit and services enhances the attractiveness of the development to prospective purchasers. Some consumers will tradeoff concerns regarding noise, traffic and safety for the convenience of neighbourhood services.

**The immediate territory**
Groupings of apartment buildings can be oriented to provide semi-public areas designed for the use of residents. An abundance of treed lots and gardens are important to consumers.

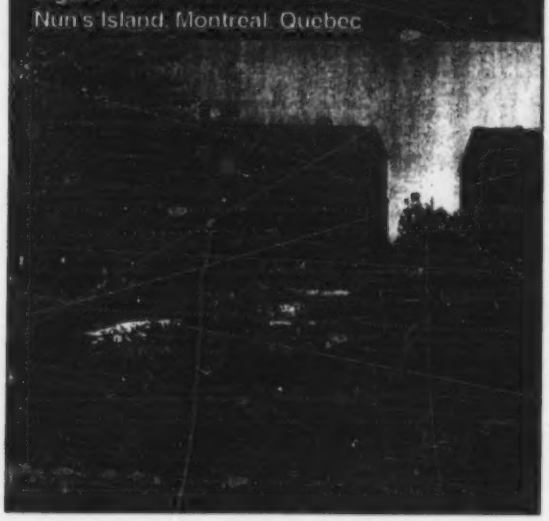
**The dwelling unit**
*Size*
Garden apartment units are typically smaller than townhouses, falling within the 80 to 110 m² range. This limitation can be mitigated by combining unit modules to create larger suites. However, to address fire and acoustic separations required by building codes and to alleviate consumer concerns, garden apartments require measures that can result in greater construction costs than townhouses. A larger number of smaller units makes it easier for costs to be distributed without negatively impacting the affordability of the development for consumers. The need for an underground garage can also affect building costs, so many developments provide surface parking when land is available.

*Layout*
In smaller buildings, most units can enjoy two exposures for light and view. Generally, the flexibility of unit layouts is restricted by requirements to accommodate structure and services. Therefore, such buildings may not lend themselves readily to modification. Building with the potential to combine units by clustering services and minimizing structural walls between suites can overcome these restrictions. Consideration of construction types and techniques may allow for more flexibility.

*Tenure and control*
Control in apartment buildings is typically defined by the bylaws of the condominium corporation.

Modifications can be made with some restrictions to unit interiors, but are generally more restrictive to exterior alterations.

Figure 11:
Nun's Island, Montreal, Quebec



The grouping of units allows for flexibility in the arrangement of parking and landscape features.

Source:
Canadian Architect, May 1991.

Figure 12:
Conservation Cooperative, Ottawa, Ontario

Located on a site with many existing trees in an established neighbourhood, the four-storey buildings form a U shape around a south-facing courtyard. The courtyard is designed to enhance interaction and contains a children's playground, garden plots for food production, composters, a tool shed, communal outdoor patio space and individual patios. The balconies are covered to provide a measure of privacy.

Source:
Advanced Buildings Newsletter, July/August 1996.

## The Mid-rise Apartment Building

The mid-rise apartment building is defined as four to six storeys in height. In the past, these structures have typically been of concrete construction, with a double-loaded corridor and elevators. While these models were developed with simplicity, economical construction and efficient layouts, they tended to restrict consumer choice with repetitive designs. Other options include single-load corridors and "skipstop" designs that incorporate two-storey suites and corridors on alternate floors.

### The surroundings

*Ambience*

Due to the increased height, the design of the building should emphasize an intimate scale. Facades must avoid repetition and monotony. Devices, such as expressing the base, middle and top of the building and varying the facade with bay windows, pilasters, etc. help to animate the design.

*Privacy and interaction*

The outdoor terraces and balconies should be oriented to increase their sense of privacy. Such exterior spaces should be covered on the lower floors to minimize overlook. Balconies that are partially or completely recessed into the main wall of the building also improve privacy, as at 130 Queen Elizabeth Driveway (see Figure 14).

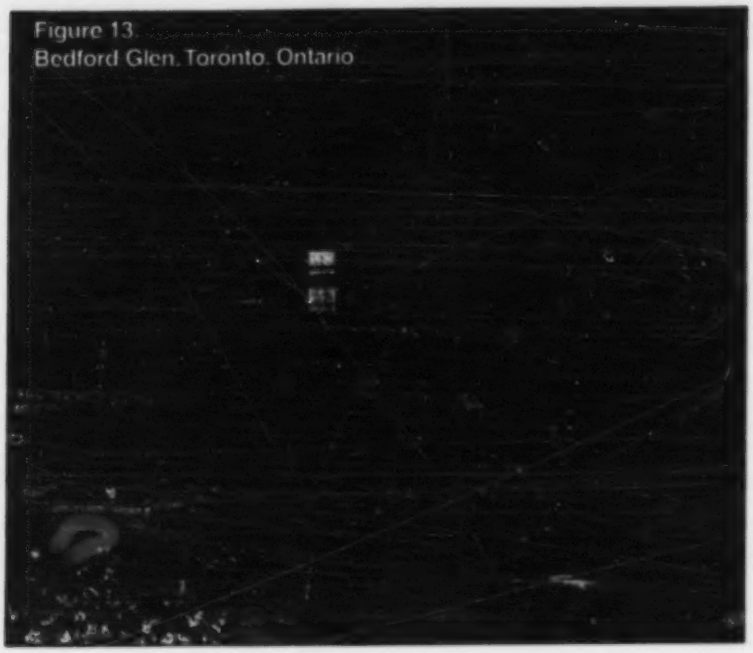
*Security*

Security relies primarily on electronic surveillance and control devices of building entrances for pedestrians and vehicles. When buildings are sited close to the street line, passive "eyes-on-the-street" security can be created.

*Mix of housing types*

Apartments have been typically single level, with a limited number of unit types and sizes offered in each building. With creative massing and flexible building systems, a broader range of unit types, including through units, extra-wide and shallow suites, and two-storey dwellings can be provided to add variety to the mid-rise apartment development to appeal to a broader consumer market.

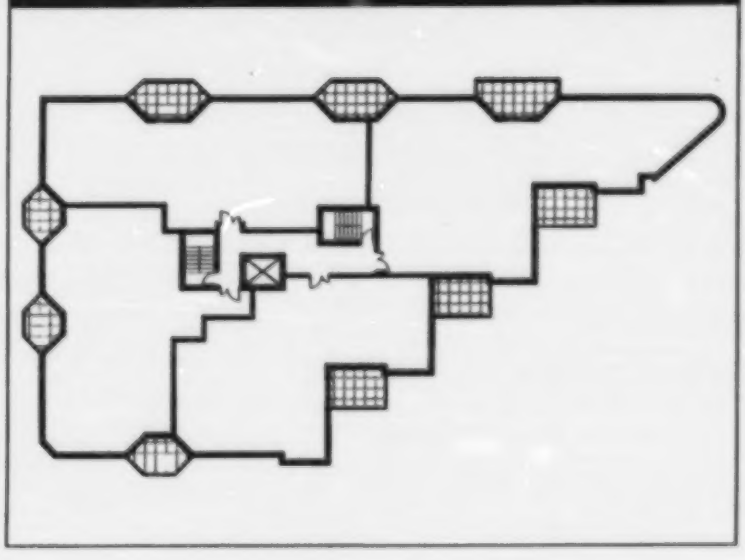
Figure 13:
Bedford Glen, Toronto, Ontario



The design of these terraced apartments retains and maximizes exposure to the surrounding natural features. "Green" endowments, such as ravines, are considered a selling feature. Successful developments should aim to preserve and enhance any existing natural features on or around the site, in conjunction with new landscaping to be added, as was done here. When developments are dense, as at Bedford Glen, the marketability of the development is improved by ensuring that the suites enjoy views or access to the green spaces.

Source:
Canadian Architect, December 1980.

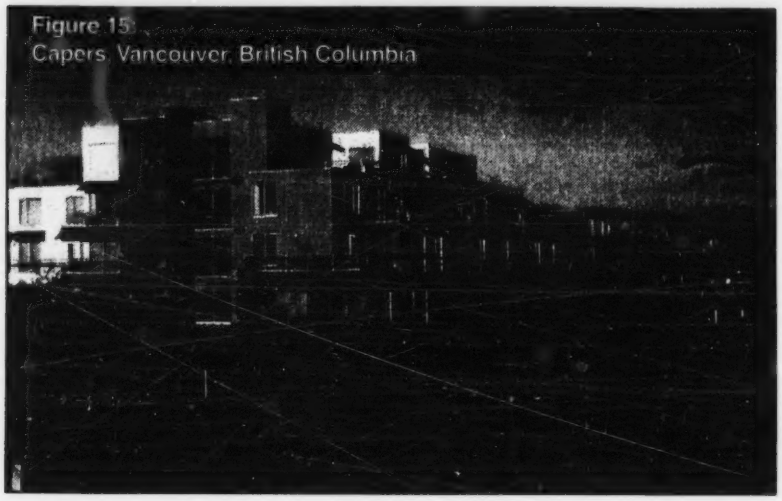
Figure 14:
130 Queen Elizabeth Driveway, Ottawa, Ontario



To maximize individual suite privacy, balconies are recessed into the building perimeter and are not placed immediately beside one another.

Source:
CHDC Awards for Residential Housing, 1985.

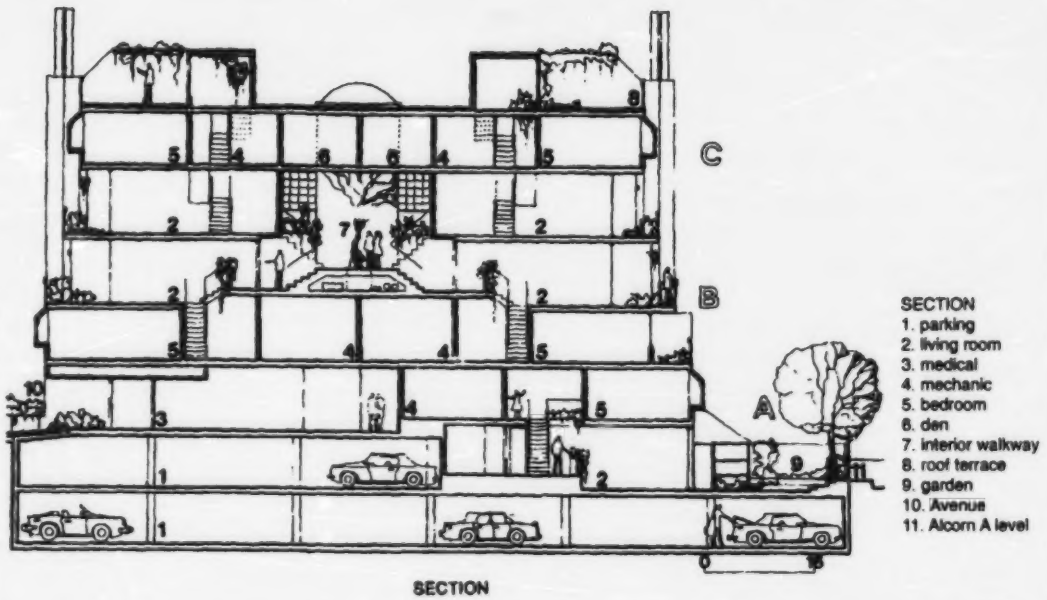
Figure 15:
Capers, Vancouver, British Columbia



This mid-rise apartment building on an urban artery combines residential and retail uses. By providing recessed courtyards for access to the residential lobbies, it enhances the separation between uses and improves security. The design provides a wide range of unit types and upper-floor private terraces to most suites.

Source:
"Interesting Capers in Vancouver," Advanced Building Newsletter, May/June 1996.

Figure 16:
Oaklands Atrium, Toronto, Ontario




SECTION

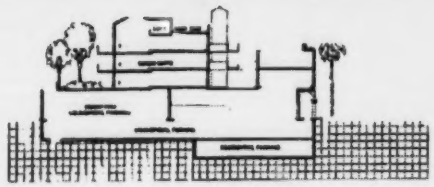
An interior upper level atrium provides the access to individual units. The design replaces interior corridors with walkways through the atrium. A variety of units are provided including two-storey units. The slight stepping back in the elevation increases interest and allows the balconies to be partly recessed and partly exposed.

Source: Canadian Architect, January 1979.

*Activities and services*

Mid-rise residential buildings are usually large enough to support and accommodate activities and services that benefit the residents. The economies of scale should permit the development of activity spaces within the building such as meeting and function rooms, exercise rooms, business centres and guest suites. These all provide additional incentives and attractions to prospective purchasers. Urban developments on main streets can also attract retail uses and services to the benefit of both residents and the community. In addition, higher densities enhance the viability of public transit.

Figure 17:
Oaklands Atrium, Toronto, Ontario



Retail and other uses at grade offer a convenient amenity for residents. The design ensures that conflicts between retail and residential uses are minimized by providing separate entrances to the apartments on the upper floors. Elevator access is provided, which allows easy access to seniors housing units. A variety of unit types are provided including the topmost suites, which are two storeys, with lofts and roof terraces at the upper level.

**The immediate territory**

The immediate area around mid-rise apartments requires care in design, to provide semi-public and semi-private areas for residents to use. Of particular concern is the creation of well-defined areas around the site that clearly delineate the responsibility for ownership and upkeep of the site for private residents and for public use. Devices such as fences, hedges and planters and hard surface landscaping provide definition to exterior areas.

**The dwelling unit**

*Size*

Noncombustible construction for mid-rise apartments, coupled with fire protection, building code requirements and underground garages, results in construction costs per square metre higher than townhouse forms. As a result, in order to maintain affordability, units are typically smaller, in the 85 to 110 $m^2$ range. However, by clustering services and using flexible structural systems (such as columns and two-way concrete slabs instead of shear walls) the option of combining and adjusting unit layouts exists. This addresses the objective of maximizing the range of unit types that are achievable.

*Layout*

In smaller buildings, most units enjoy two exposures for light and view. Unit layouts can be made more flexible through careful location of services and structural elements, and by using construction materials that lend themselves readily to modification. Internal layouts should aim to locate as few difficult-to-move elements as possible near the exterior walls to maximize flexibility in locating partitions between rooms.

*Tenure and control*

Control in apartment buildings is typically defined by the bylaws of the condominium corporation. Modifications to the interior can be made with some restrictions.

# 4. THE HYBRID: AN OPPORTUNITY

The above analysis of the most popular medium-density housing forms demonstrates that each form offers its own distinct advantages and carries certain attributes which may be attractive to different purchaser household profiles. Furthermore, one form may offer advantages to one household type which, while not necessarily of prime importance to them, may, in fact, help to influence their purchase decisions toward medium-density housing.

For example, while semi-private outdoor spaces may be of importance to families with children, such an amenity may also offer opportunities for garden plots, which are of significance to seniors. As another example, if higher density developments include grade-related townhouses, such a combination would give families with children an important housing amenity. Further, such hybrids offer residents the opportunity to live in developments with greater diversity, an attribute of importance to certain households.

An opportunity exists for developers seeking to create medium-density housing to expand the appeal of their projects in the marketplace by creating hybrids which combine more than one medium-density housing form. Hybrids have been identified among the precedents (see for example Figure 16 as successful examples of medium-density housing forms. Their success in the marketplace suggests that such combinations offer promise for the development of medium-density housing that can overcome some of the concerns and address many of the expressed needs of prospective purchasers.

For this reason, both of the prototype projects designed for this study are hybrids. Prototype A combines townhouses, stacked townhouses and lowrise apartments, while Prototype B includes stacked townhouses and mid-rise apartments. In combination with other attributes, hybrid forms can significantly enhance the success of medium-density housing with purchaser households.

The initial focus group responses indicated that most medium-density housing types do not satisfy their expectations. From this information, it is clear that new models of medium-density housing forms need to be explored.

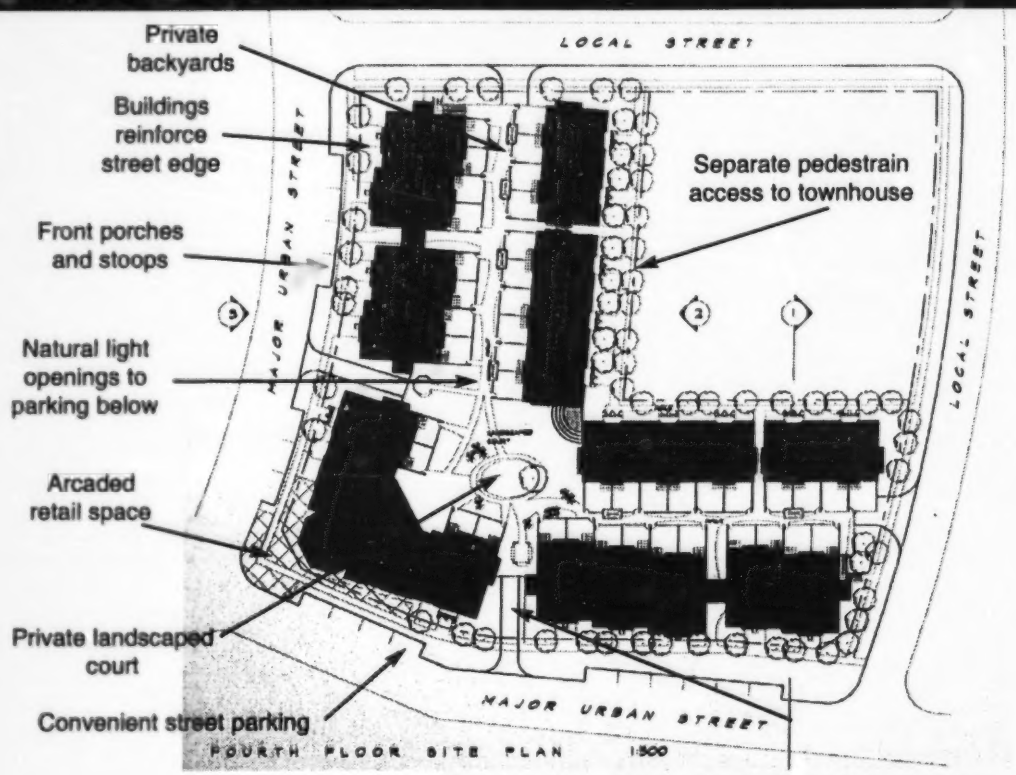
Two prototypes have been developed for existing sites in the Regional Municipality of Ottawa-Carleton. Both designs are a hybrid of several forms of medium-density housing and create unique and attractive living environments, embodying features likely to meet consumer expectations. For example, Prototype A combines townhouses, stacked townhouses and garden apartments, while Prototype B includes stacked townhouses and a stepped eight-storey apartment building. The prototypes also incorporate available sustainable technologies and design strategies to demonstrate ways of reducing the environmental impact of housing beyond increasing density.

### Prototype A: The Suburban Model

Centrepointe and Tallwood Drive
Nepean, Ontario
Site Area: 1.017 hectares (1.794 acres)
Total number of units: 90
Density: 88 per hectare (50 per acre)

This prototype for a suburban municipality includes three different housing types: townhouses, stacked townhouses and garden apartments (Figures 18 and 19). It is a two-and-a-half to four-storey, lowrise structure in keeping with the scale of the surrounding neighbourhood, located close to the municipal city centre at a key access point to a ring road. Parking is provided in a secure, atgrade structure roofed by a large landscaped deck running through the centre of the entire site, which acts as a central outdoor community space for the development. This

Figure 18:
Prototype A site and ground floor plans




Good on-site vehicular circulation and street access.
Most units have direct access to private parking

prototype sets a precedent for building more urban, main street related and mixed-use developments in suburban locations. It promotes intensified land use within the realm of suburban norms. This prototype stands in contrast to the "tower in the landscape" model which is more common in suburban higher-density developments.

**The surroundings**

*Ambience*

Located in an established family-oriented neighbourhood within walking distance of convenience shopping, rapid transit, schools and a parks system, Prototype A offers four-storey, brick and stucco buildings surrounding a large, secure garden courtyard.

*Privacy and interaction*

The development is focused on a secure, raised landscaped courtyard which is internal to the site and provides for private yards for the townhouses and lower stacked townhouses. In addition, shared semi-private areas are provided near the apartment building for gardening and a children's play area.

*Security*

Parking entry is controlled by electronic security devices. Located at grade, the parking garage is well lit with both lighting fixtures and natural light from large skylights. Access to the upper stacked townhouse and apartment units is through controlled vestibules and elevators. The clustering of dwellings provides for passive monitoring of adjacent common areas and streets from the units.

*Mix of housing types*

The development incorporates different unit types. A broad range of households, including single seniors and large families can be accommodated. The medium-density housing forms provided include garden apartments, townhouses and stacked townhouses. All of these different forms are incorporated into visually consistent clusters of buildings to provide a uniform character to the development.

*Activities and services*

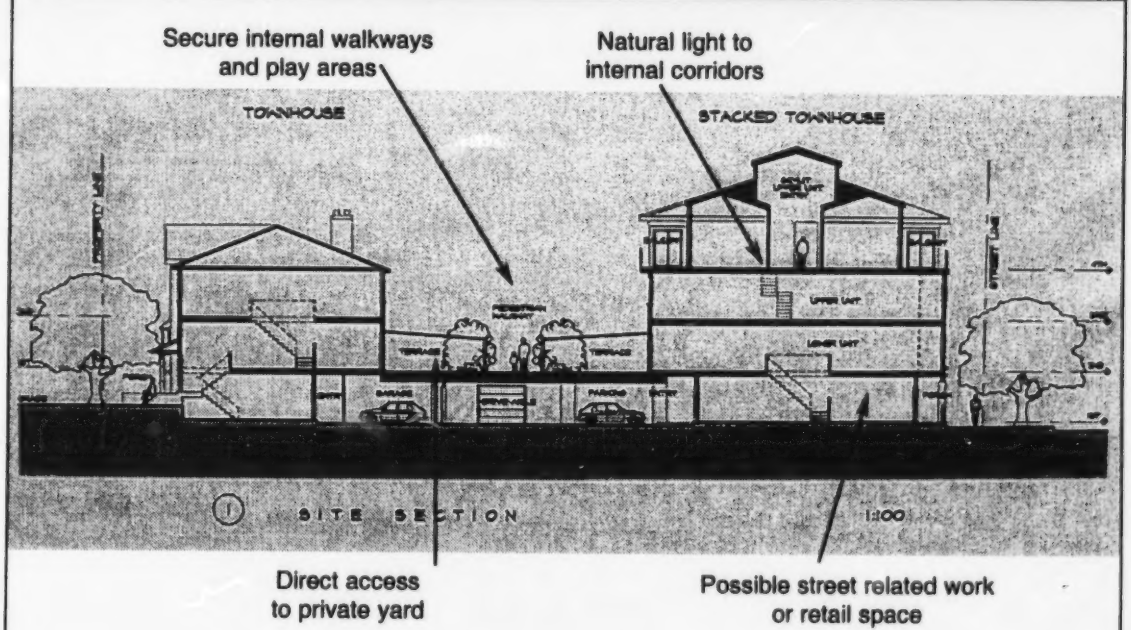
The site is adjacent to a bus stop and a 10-minute walk to a major transit terminus, bike path and parkland. The ground floors of all the buildings facing the streets are designed to accommodate either non-residential or residential uses. The ground floor of the corner building, totalling 460 m², is dedicated to convenience retail and/or community services. The street facades feature porches that could also act as a pedestrian arcade if the commercial use of these grade-related levels increases. The second floor of the corner building includes an interior shared amenity area off of the central courtyard for residents' social functions and community programs.

**The immediate territory**

Access to the units is directly from grade for townhouse and lower stacked townhouse units, which comprise the majority of the dwellings. Upper stacked townhouse and apartment units are provided with large terraces (minimum 15 m²). The upper stacked townhouse units are accessed via shared elevators. Large skylit corridors at the top floor provide natural light.

**The dwelling unit**

Figure 19:
Prototype A: Site section



*Size*
A range of unit types and sizes are provided, from 75 m² one-bedroom apartments with balconies to 200 m² townhouses with private backyards at court level. Some units are convertible to create a small income unit for rental. This range of unit types and sizes introduces the potential for a broader spectrum of socioeconomic levels and household types than the traditional suburb.

*Layout*
Townhouses offer the opportunity for a vertical separation of functions to increase privacy between floor levels of the dwelling. The stacked townhouse units are arranged to permit easy division into smaller units or shared occupancy by singles or seniors. Construction systems utilizing longspan manufactured lumber will provide additional flexibility in internal layouts and adaptability by eliminating the need for intermediate structural walls.

*Tenure and control*
The units can be held in condominium form. All units feature large outdoor areas or terraces for private use and have the potential for significant internal and some external changes without compromising the condominium requirements.

**Ecology and environment**
*Standards*
The proposed construction and systems for the development exceed R-2000 standards and National Energy Code for Housing (NECH) criteria. Utilizing wood-frame construction, the development can be built economically.

*Heating, ventilation, air conditioning*
- individual suite heat recovery ventilators with high-performance fans and ground source preheat (avoids defrost);
- floor cavity ceiling radiant heating and cooling using make-up air coil delivery through plenum (requires open web trusses);
- direct ground source cooling to hydronic coils;
- heating supplied by central woodchip co-generator (probably wood-gas driven Stirling engine) located in parking level;
- sitebuilt solar domestic hot water roofing (possible hybrid photovoltaic); and
- central domestic hot water with graywater heat recovery, with recirculation also delivering space heating.

*Electrical services*
- high efficiency lighting and appliances built in; and
- grid connect site generation with co-generation and photovoltaics on reverse metering and sub-metered in-house billing, possibly green power purchasing.

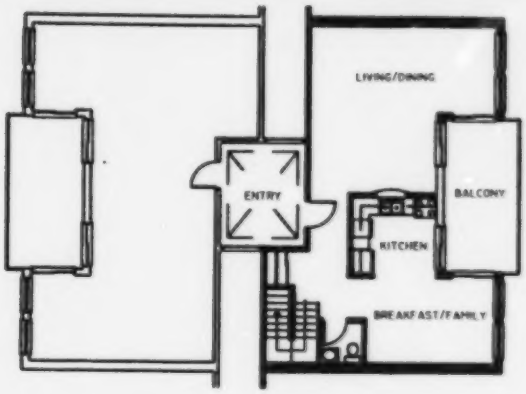
*Sewage and water*
- individual compost toilets using 1.5L flush to basement level;
- common area access for compost products collection by maintenance personnel;
- rainwater collection and cistern storage with biofiltration for reuse, irrigation and flush;
- graywater treatment using greenhouse growing bed;
- water supply either dechlorinated municipal supply or treated rain and graywater; and
- cold water supply on recirculation for space cooling and sprinklers.

*Waste management*
- basement level "bluebox" collection; and
- composting through drop shaft in kitchen to human waste composter.

*Landscape and stormwater*
- treed and vegetated deck and terraces;
- sod covered roof; and
- rain overflow to cistern.

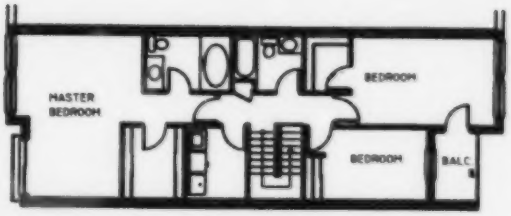
Figure 20:
Prototype A Unit Plans

Fourth Floor




Third Floor

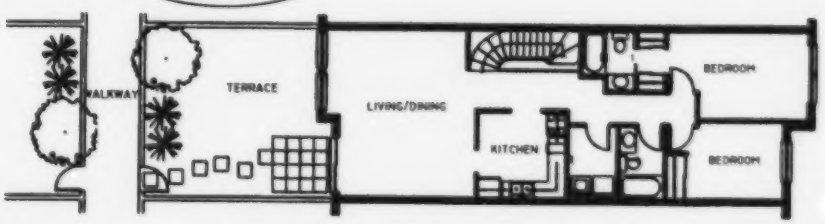
Good unit size



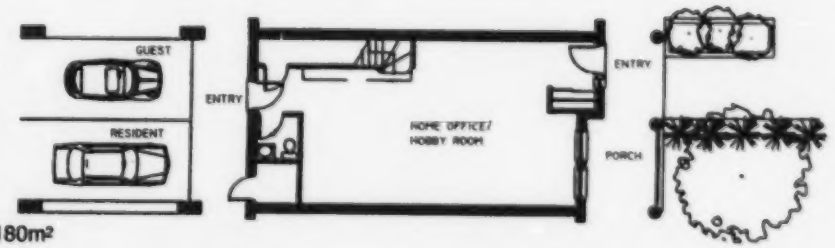

Upper Stacked Townhouse Unit Plans
Total Unit Area = 190 m²

Abundant light, views and air

Second Floor

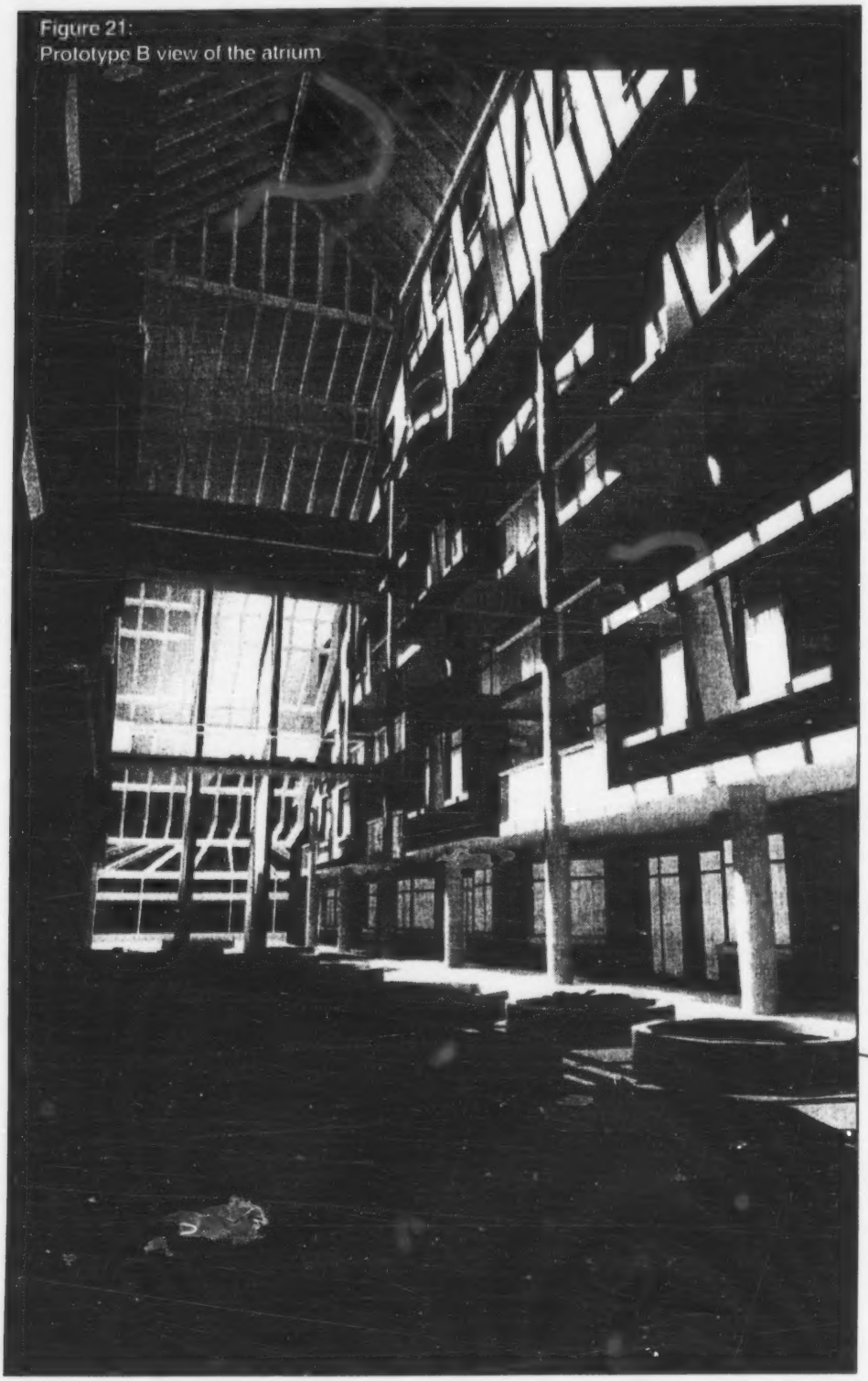



First Floor




Lower Stacked Townhouse Unit Plans
Total Unit Area = 180m²

Figure 21:
Prototype B view of the atrium



Light-filled, weather-protected, common and semi-private space

## Prototype B: The Urban Model

Argyle, Metcalfe and Catherine
Ottawa, Ontario
Site area: 0.726 hectares (1.794 acres)
Total number of units: 114
Density: 157 per hectare (64 per acre)

The second prototype has been developed at a density in keeping with its location in a major urban centre (Figures 21 and 22). It is a modified apartment form, featuring a large shared atrium in lieu of corridors and a courtyard ringed by stacked townhouses. Parking is in a secure atgrade garage, which is naturally ventilated and roofed by a landscaped deck.

The atrium provides a secure, year-round interior open space for residents, a valuable asset during Ottawa's severe winters. It also allows light to penetrate both sides of the dwelling units and acts as the common circulation space to the suites in lieu of an interior corridor.

The raised terrace creates secure open space and outdoor children's play areas which are above street level, away from vehicular traffic and pedestrians. The stacked townhouses form an acoustical barrier to noise from the nearby street and highway.

The parking at grade is more economical than underground and, in this case, avoids unfavourable soil conditions as well.

Figure 22:
Prototype B courtyard

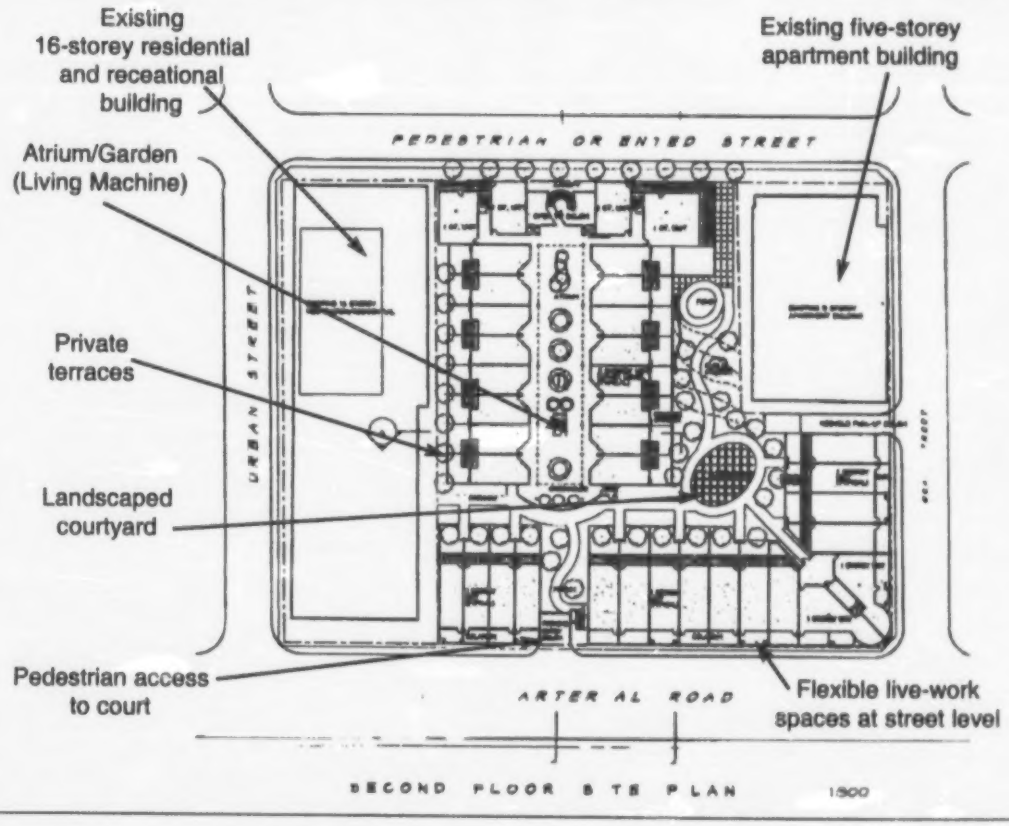
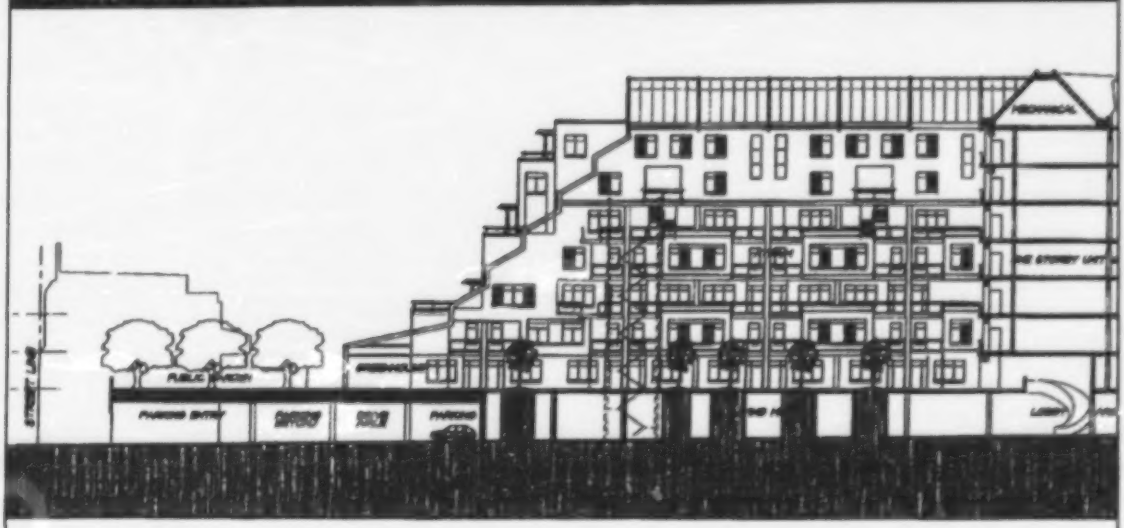
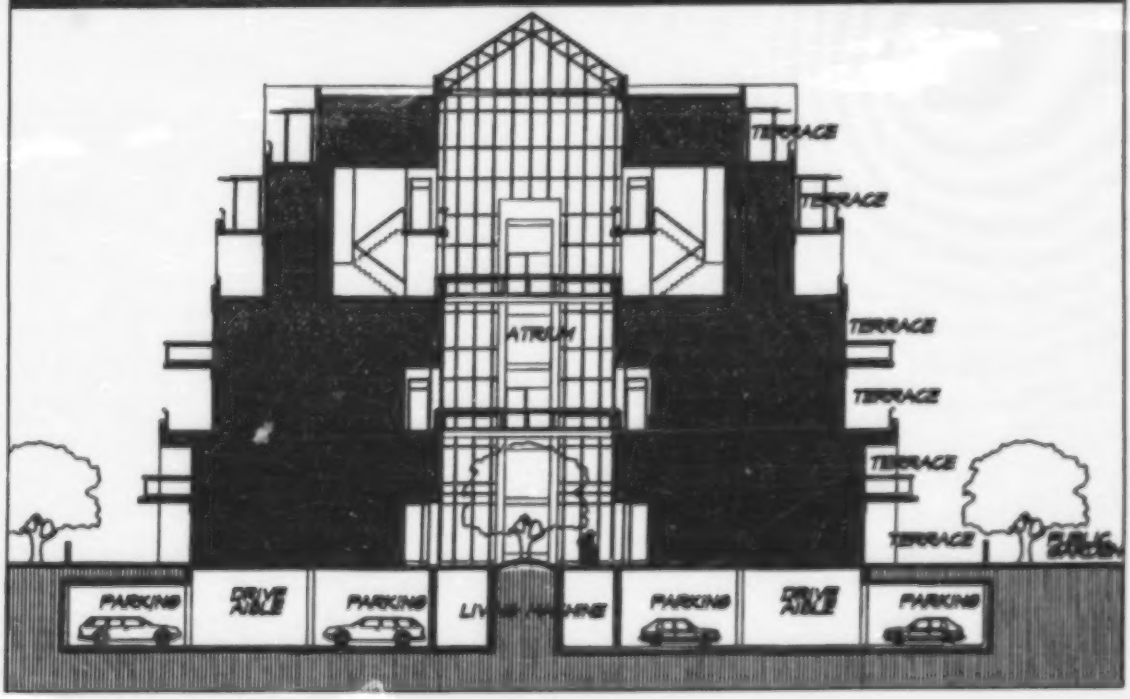


Figure 23:
Prototype B site section




(2) SITE SECTION THROUGH ATRIUM

Figure 24:
Prototype B Cross-section through Atrium



**The surroundings**

*Ambience*

The buildings are arranged in response to the context. The eight-storey apartment building, fit between five- and 16-storey buildings on each side, fronts onto Argyle, a pedestrian-oriented street. Four-storey stacked townhouses front onto Catherine, a major arterial road and shield the internal courtyard from the noise of an adjacent highway. The townhouse structures are designed to emphasize the individual unit through articulation of the massing and detailing of porches and terraces. The atrium apartment building is stepped back from the south to minimize its impact on the courtyard and townhouses.

The availability of a landscaped courtyard, flexible unit layouts, the potential for live-work spaces, adequate parking and a variety of amenity spaces, coupled with the site's proximity to downtown Ottawa, are all features that will attract a broad range of purchasers from the market place.

*Privacy*

The lower stacked townhouse units have private rear yards at the courtyard level that are sheltered from the street to provide acoustic, physical and visual privacy. The units in the atrium building all have large outdoor terraces or enclosed sunrooms.

*Security*

The semi-private interior courtyard provides a secure shared area for use by residents. Access to the garage would be security-card controlled and monitored, and the garage is well lit, with direct connections to some units. Natural light is brought in from the open sides and via skylights and a sunken "living machine" in the atrium.

*Mix of housing types*

The development includes stacked townhouses and one- and two-storey (loft) apartments. Unit modules are sized in three floor area ranges: 30 modules at 60 to 80 m² (traditional one- to two-bedroom sizes); 40 modules at 90 to 110 m² (traditional two- to three-bedroom sizes); 50 modules at 120 to 150 m² (traditional three-bedroom sizes and larger). The unit modules are designed to permit flexibility in meeting the needs of the purchasers' household profiles, by allowing for variances in the number of rooms and the sizes of rooms as desired.

*Activities and services*

The ground floors of both buildings are designed to be used for nonresidential uses as well as ancillary residential functions. Clear heights are ±12'0" (3,600 mm) to accommodate commercial and retail occupants. In addition, the parking garage is designed as flexible space, so if the demand for vehicular storage is reduced and demand grows for other uses, these can be easily introduced. As an urban site, the development has convenient pedestrian, transit and vehicular access to shopping, employment, recreation, cultural facilities, schools and social services.

**The immediate territory**

The stacked townhouses place public and private areas on opposite sides of the dwelling. The private outdoor areas are designed to provide privacy from the adjacent courtyard through the inclusion of fences and landscaped dividers, while enjoying easy access to the common outdoor spaces.

**The dwelling unit**

*Size*

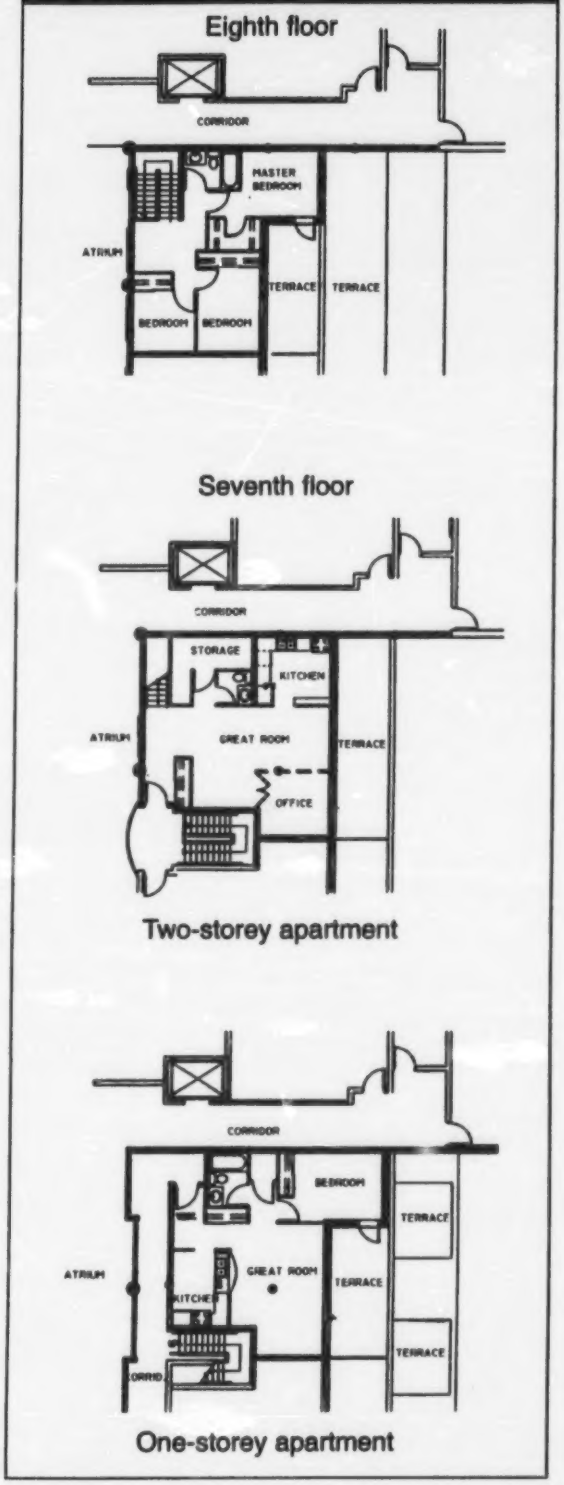
Clear floor-to-ceiling heights are increased from the 8'0" (2,450 mm) typical residential standard to 10'0" (3,000 mm) and 12'0" (3,600 mm) at the ground floor to allow for easy conversion to office or (in the case of ground floor space) commercial uses. The unit modules are also larger than standard sizes and their modular nature accommodates a variety of layouts. Each unit has a large private outdoor area (minimum 15 m²).

*Layout*

All unit modules feature large expanses of glazing (spaced to allow for subdivision into separate rooms) and access to natural light. Many suites also offer views in two directions. Based on a reinforced concrete column and two-way slab structure, there is significant flexibility to combine or subdivide modules, horizontally and vertically, to accommodate purchaser requirements, through the location of demising walls and service chases. Units along the streets that could support non-residential uses or ancillary residential functions, are also adaptable to residential uses. The units at the lowest level of the atrium are also designed for residential uses but could be converted to non-residential uses in response to future demand. All upper levels of the Catherine and Metcalfe building are shown as dwellings, but are designed to convert easily to office uses should public or private sector users require the space.

Within the units, features which support flexibility in layouts (including locations of electrical and telecommunications outlets) allow for erection or removal of portions of walls to create alternative uses of space. Large entrance vestibules enhance privacy within the units and allow for separation of ancillary uses and residents. At the same time, these larger entry areas also accommodate the needs of older relatives, older and younger children, seniors, persons requiring assisted living, etc., by allowing extra room for preparation prior to entering or leaving the dwelling. The flexible layouts also attract "mingles" (unrelated singles living together), by allowing for separate sleeping areas on each side of the suite, with common areas in the middle.

Figure 25:
Prototype B floor plans



and will allow for a great degree of flexibility for changes inside the unit.

**Ecology and the environment**

*Standards*

The development is designed to meet a maximum energy consumption level of 55 per cent of ASHRAE 90.2 (American Society of Heating, Refrigeration and Air-conditioning Engineers) and exceed C2000 standards.

*Heating, ventilation, air conditioning*

- central exhaust ventilation with make-up air enthalpy exchange and ground-coupled preheat (via vertical coils to air coil);
- frozen soil used for summer air-conditioning (need soil conditions report and determination of impact on foundation and slab);
- air delivery via atrium or halls to units through anechoic transfer grilles;
- space heating and cooling (sensible) delivered via inslab hydronic ceiling with thermal and acoustic insulation on slab top beneath floor finish (German standards for low sound transmission);
- humidity control in atrium or hall make-up air with chiller coil between double heat exchangers; atrium to provide humidity control, biofiltration, plant thermal moderation (high efficiency air filter on make-up air);
- heat source combination space and domestic hot water from gas-fired (preferably methane from anaerobic digester), co-generator, also used for emergency power; and
- auxiliary or alternative cooling with absorption rejecting to ground or nightsprayed cistern water.

*Direct solar utilization*

- sunspaces on main street, using high-performance glazing, interposed mass wall, large openings for venting, transparent photovoltaics on sloped glazing;
- day lighting in atrium with reflective surfaces, windows and translucent panels to units;
- thermosyphon solar domestic hot water heating to recirculation circuit using selective surfaced collectors within atrium and sunspaces; and
- photovoltaic roofing and awnings.

Electrical services

- high-efficiency air handling and water circulation with variable speed drives;
- common lighting with occupancy sensors, daylight compensation, T5 fluorescents with high-efficiency ballasts and fixtures (full spectrum HID in atrium, PL fixtures in units);
- directvent gas cooking, high-efficiency refrigeration (nonhalon refrigerant), high-efficiency washer/dryer; and
- sub-metered units with reverse meter grid connection for renewables generation.

*Sewage and water*

- "living machine" in atrium with anaerobic tank for all buildings (located in parking level);
- clear insulated glass tanks extend into parking level for viewing and light penetration;
- reuse for flush water and irrigation with remainder fed to sanitary;
- plans for air filtration integrated with system;
- harvestable species (such as cut flowers);
- low water consuming fixtures (washing machines);
- heat recovery of shower/tub waste water; and
- potable water supply either dechlorinated city water or treated rain plus living machine water.

*Waste management*

- Compostables collected in separate "green box" at units delivered to sealed aerobic vermiculture composter for local fertilizer application;
- recyclables collected at door and separated for direct sale or municipal pickups; and
- charges for disposal bags—cost recovery for waste management service through sale of material and compost.

*Landscape and stormwater*

- Extensive tree planting at ground level for shade, microclimate, habitat, fruit, nuts, stormwater mitigation;
- planted decks using soil or lightweight medium (Soprema system) with rainwater retention layer;
- rainwater catchment and overflow from decks through sand filter to central cistern for reuse; and
- ground-level deck drained to vegetated pond water feature.

# 5. MARKETING MEDIUM-DENSITY HOUSING

The study delineates the key target markets for medium-density housing and also identifies:

- the attributes that will maintain likely markets; and
- those attributes that can make medium-density housing attractive to the prospective purchasers who, with all other factors being equal, would be most likely to choose a single-family detached house in a low-density community.

## The 10 Desirable Attributes

The focus groups (made up of potential consumers of medium-density housing) have identified 10 specific attributes of housing that have the most significant impact on the decision to purchase. These attributes relate to the surrounding community, the quality of the immediate territory around the development and the dwelling unit itself.

### The surroundings

*1. The character of the community and the ambience of the development*

A variety of factors including the natural, social, environmental and designed attributes particular to a place define the character of the community. This character is a fundamental determinant of a development's desirability. The endowment factor of a development relates to the nature of its site (topography, vegetation, orientation, size of site, etc.) and its surroundings (type of neighbourhood, availability of services and amenities, etc.).

The study reveals that by exploiting location endowments (proximity to open space, shopping, recreation, etc.) medium-density developments can attain a greater degree of marketing success (Leung, 1997). While location is not an attribute that arises out of the development's design, it could act as a key "tradeoff" factor that balances out some perceived deficiencies of living in a multiple unit dwelling. The quip which states the three most important reasons for buying real estate are "location, location and location" implies that designers have the opportunity to enhance this attribute through designs that reinforce and are compatible with the positive aspects of the surrounding community.

This issue also highlights the importance of cause and effect in siting medium-density housing. For example, the resulting increased densities may enhance the viability of providing public transit. Alternatively, it may be advantageous to locate medium-density housing where public transit already exists, to enhance the development's market success. Similarly, it may be advantageous to build where there are natural features to be exploited in the design, or if none is available, to create a "green" focus on the site.

*2. Proximity to amenities and services*

Most target markets value proximity and convenient access to community amenities such as schools, shopping, recreation, social services and public transit as well as employment opportunities. The amenities which are emphasized in marketing must, of course, address the concerns of the target market (e.g., proximity to good schools would be critical to a young family).

The design of the development, while having limited control over access to such amenities, can still contribute to its value by creative measures (e.g., incorporating a sheltered area into the facade adjacent to a bus stop). In addition, developments endowed with proximity to transit services allow young people and individuals without cars (or those who don't wish to use cars) to both remain independent and reduce the external costs that arise from owning private transportation.

**The immediate territory**

*3. Privacy and interaction*
A key concern of prospective purchasers is the potential for loss of privacy in medium-density housing. This perception includes worries about smells and noise transmission from adjacent units and common areas (corridors, party rooms, laundry rooms, elevators, etc.), as well as the forced interaction with neighbours and unit owners (through the use of numerous shared amenities, a limited number of routes through the development, etc.). Specific design measures that can address these concerns include direct access from the dwelling to the street, a direct connection from the parking space to the unit, a hierarchy of spaces within the development moving from private to semi-private to public, high levels of sound attenuation, construction materials and technologies (concrete block demising walls are perceived to be better than studs and drywall) and separate fresh air sources for units and common corridors.

*4. Security*
While some of the "sense of security" for a medium-density housing development comes from its surroundings (if the neighbourhood is perceived to be "safe," marketing will be made easier), purchasers, rightfully or not, equate all forms of multiple housing with a reduction in security over single-family detached dwellings. The marketing campaign must address such concerns by emphasizing how the design promotes passive security measures as well as safety features such as electronically monitored security systems, card-controlled access to the building and underground parking, and a 24-hour concierge. Special measures for common parking areas are also important, such as effective lighting, painting walls a reflective colour and introducing natural light into the space.

*5. Individuality*
A perceived negative in the eyes of prospective purchasers that marketers of medium-density housing should seek to counter is a loss of identity and the opportunity for individual expression (both inside and outside the dwelling). A common image of multiple housing is the anonymous highrise building or row upon row of identical townhouses. Design plays a major role in alleviating consumer concerns regarding the unattractive homogeneity of a development. Individuality can be accomplished through the expression of demising walls, variations in exterior materials and fenestration patterns, and by providing each unit with large exterior private space. The desire for individuality must, at the same time, be balanced by a desire to ensure the development projects a consistent character.

*6. Sense of control*
Owners of single-family detached houses are seen in popular culture as rulers of their own domain ("one's house is one's castle"). Multiple housing, on the other hand, is perceived to require the individual to cede control of his territory to other parties, whether these parties are the condominium corporation and its bylaws and regulations, the concierge at the front door or the other residents of the complex. This issue must be addressed head-on in marketing multiple housing. The condominium tenure has strengths in ensuring that both the physical condition and the resultant value of the project as a whole (and each individual unit) are maintained (even though this means that residents may not, for example, be permitted to paint the exterior of their units different colours). Similarly, while the concierge (or other aspects of the building's security system) may constrict the process of informal visits by friends who drop by, the system enhances security (against intruders or annoyances) well beyond that available in a single-family detached house (which could be left empty and unprotected during workdays or vacations, for example). The fact of sharing the development with other residents can be portrayed as its own style of neighbourhood (especially when marketing to affinity groups).

**The dwelling unit**

*7. Space*
A significant concern in the minds of most prospective purchasers of medium-density housing is the size of the dwelling unit, whether

this is expressed in terms of floor area or number of rooms. While historically, apartments and townhouses have tended to be smaller than detached dwellings, there is no inherent limitation to unit size beyond the ability of the target market to afford to purchase the suites. The inclusion of larger units in some developments could attract residents who would normally expect to meet their space requirements only in a single-family home. This is particularly true when the larger units are also coupled with other amenities and advantages not available in a detached dwelling.

*8. Adaptability*

The detached dwelling on its own freehold lot offers the resident a certain amount of flexibility in adapting the structure to meet changing requirements. This flexibility includes interior renovations (made cost effective due to wood-frame construction and flexibility in relocating services) and expansion. (Additions, within the constraints of zoning regulations, lot size and structural capacity can be accomplished both horizontally and vertically.) Furthermore, changes in use, such as the introduction of a home office, can also be accomplished (again, except as constrained by zoning) with minimal intervention. By contrast, multiple dwellings are constrained by their demising walls and by the requirements of the structural systems and services including electrical, plumbing, fire safety, heating, ventilation and air conditioning (HVAC), telephone and telecommunication, etc. which affect other suites above, below and adjacent. Design can, however, provide significant relief from these constraints by using the most flexible structural systems. In mid-rise buildings, for example, reinforced concrete columns and two-way slabs provide more flexibility in locating internal partitions than a typical shear wall system. Similarly, locating service shafts along corridor or exterior walls rather than in internal partitions allows for more flexibility in interior renovations. In addition, if live-work spaces are anticipated, installing additional electrical, telephone and telecommunication outlets for future use allows for greater choice in furniture layouts.

Furthermore, such construction techniques also increase the options for combining units to create larger suites (or subdividing to make smaller ones). With forethought, such expansion and contraction can be accomplished with ease comparable to that found in commercial office buildings today (CMHC, 1997).

*9. Light and views*

A common constraint of apartment building forms is that units are often provided with a single aspect, that is a view in one direction only. This condition is the result of an allocation of the conventional system of units on either side of a doubleloaded corridor. It has already been demonstrated that most forms of medium-density housing can incorporate views in two (or more) directions and designs should strive to accommodate this in as many units as possible in a development. A variety of views enhances the "house-like" qualities of the dwelling and provides improved natural ventilation. This is an important element in marketing, because views in different directions are a desirable feature that can be understood by purchasers with limited abilities in comprehending floor plans. Even in units which have single aspects, the introduction of deep bay windows, projecting balconies or terraces can enhance exterior views. Of equal importance is maximizing the sizes of windows and glazing (subject to constraints from furniture layouts and HVAC operating costs), design elements such as low sill heights to allow views out while seated, and the provision of adequately sized and easy-to-use operable windows.

*10. Value*

Perhaps the greatest challenge in marketing medium-density housing remains that of adequately demonstrating its value to prospective purchasers. Purchase price is a significant factor in the decision-making process of buying a home. It is clear that pricing of the units and the features being offered must be competitive with other similar developments. In marketing medium-density housing, an important message to convey is that, while purchase price on a "square foot" basis may not be as low as conventional developments, medium-density housing offers potential savings on operating costs and other externalities. These ongoing "savings" may come in the form of reduced utility costs and even eliminating a second (or first) car because of a move to a more central location.

## Marketing the Study Prototypes

The suburban and urban prototypes developed for this study were presented to the focus groups for their reaction to how well the developments meet consumer expectations. These discussions of the two prototypes have guided the strategies for marketing successful medium-density housing described below.

### Prototype A

Prototype A stands as an example of a project that could be successfully developed to the low risk/benefit portion of the medium-density market. This suggests that the majority of the units would be targeted to household types that would have a high probability of living in townhouses or other forms of medium-density housing.

The surroundings already include other condominium townhouse developments and Prototype A's suburban location has a land cost lower than that of Prototype B. The design is compatible with its surroundings (existing and proposed) and is conveniently located to nearby shopping, community services, schools and public transit.

A significant portion of the units are conventional townhouses. Although they share access to the garage structure, the townhouses enjoy a private lockable parking space and direct access to the suite.

Stacked townhouses are another large component of units with a lower grade-level unit on the street and an upper two-storey suite. These could be sold as a single package, offering the options of live-work units, for subdivision into a rental unit and an owner-occupied suite or combined into a single three-storey suite. These also enjoy direct access from a private locked parking space within the garage.

The upper level apartments offer a variety of suite layouts, which could easily accommodate target households including seniors, lone-parent families, singles and mingles. Access via elevators and security is similar to that found in highrise structures, and the upper-level landscaped courtyard provides a respite from vehicular traffic.

Relatively low construction costs and land prices, coupled with savings in operating costs from advanced environmentally friendly systems, make this development attractive to the low risk/benefit target group and achieve higher densities, all within a lowrise envelope and construction.

### Prototype B

Given its central urban location and creative architectural design, Prototype B offers an opportunity to focus the development to high risk/benefit households in the target markets for medium-density housing. With creative approaches to addressing tradeoffs, it should be possible to attract an adequate number of prospective purchasers for such a unique project.

The surroundings are unconventional, yet they offer unique benefits unavailable elsewhere in the city. The site is directly across the street from a large and beautiful urban park and a historic building housing a museum. The new development shares its site with existing apartment buildings and is adjacent to a fitness and recreation facility. Public transit passes right by the site and vehicular access to the major highway traversing the city is within a few blocks. The area also offers a mix of stable residential neighbourhoods and commercial and retail establishments.

The mid-rise structure, with its magnificent atrium space and highly flexible residential unit modules, could be sold as "loftstyle" units in a mix of one- and two-storey modules and targeted to a sophisticated emptynester market, who could undertake extensive customization of the suites and appreciate the urban and environmentally advanced building systems.

The stacked townhouse units could be successfully marketed to singles, mingles, a limited number of small families, and professionals and entrepreneurs interested in using the ground floor space for commercial and investment purposes or live-work uses.
The height and configuration of the atrium

building offers orientation and views commensurate with an upscale condominium. The atrium and private upper level landscaped courtyard, shielded from vehicular traffic and noise by the stacked townhouses, are added urban amenities.

Value is derived from the practical and unique nature of the dwelling units' design and the significant savings in operating and carrying costs derived from the environmentally progressive and sophisticated systems in the building. It is not inconceivable that in a cosmopolitan, well-educated and technologically advanced urban centre such as Ottawa, purchasers could be attracted to invest in (a maximum of) 90 units with such advanced systems and design. Furthermore, once the approaches have been shown to be successful, the project, or its components, could be replicated elsewhere in the city.

# 6. CONCLUSIONS: A BLUEPRINT FOR ACTION

Two broad conclusions can be drawn from the study of the 1991 census data for the Ottawa region: a growing number of household types are attracted to medium-density housing and demand for detached dwellings remains strong among all household types, when housing prices remain stable relative to household income. The challenge for medium-density housing is to design projects that will maintain households already drawn to this housing form and further increase market share by attracting households currently drawn to single-family dwellings. The study research suggests that a combined strategy of continuing to offer what works well for traditional markets and offering novel alternatives to groups that are choosing between medium-density forms and lower densities could contribute greatly toward achieving the goal of making cities more compact.

## Maintaining Traditional Markets

The traditional markets for medium-density housing are largely made up of singles, couples without children, lone-parent families and empty nesters. For analyzing development opportunity risk, the "traditional market" has the consumer characteristics of the "status quo" group.

## Identifying and Designing for High Risk/Benefit Consumer Groups

Households with incomes at the lowest levels that still allow them to afford a single-family dwelling pose a marketing challenge for providers of medium-density housing. In the Ottawa region, this household has an annual income of $55,000 to $65,000 in 1997 dollars and is identified as high risk/benefit. The goal is to attract a large share of this market with attractive and compelling projects. When designing housing for this group, it is important to keep the following in mind.

- The group as a whole is composed of many subgroups, which have different lifestyle aspirations. There is room for different types of projects that address the priorities of each subgroup.
- Note that tradeoffs play an important role in the housing decisions of this group. Primarily because of cost and security considerations, this group is interested in medium-density forms. Designs which respond to the positive attributes and mitigate the weaknesses of multiple housing presented in this report will enjoy an increased probability of success.
- Identify the preferred price range for the group and be aggressive about providing as many of their desired attributes as possible within that price range.
- Remember that this group is attracted to sites that are in close proximity to public transportation.
- Investigate in-fill and brownfield sites that are situated in recognizable and established communities.
- Consider marketing larger units, since the consumer profiles indicate that most households in this group expect three to four bedrooms in their dwellings.

## Housing Forms Most Likely to Appeal to Consumers

Townhouses and other semi-attached dwellings are the most popular forms of medium-density housing. Concurrently, the housing attributes which the focus group participants identified and responded to most positively can also be most readily incorporated into these housing forms (Leung, 1996, 1997).

The townhouse option is the primary substitute for single-family houses. The market share enjoyed by this building type stays relatively constant for all households earning between $40,000 and $110,000 a year in 1997 dollars.

The appeal of the townhouse form is also evidenced by the 1991 census data for the Ottawa region, which projects that 30 per cent of the total growth in the future demand for new dwelling units will be in the duplex and townhouse category. The increase in the share will come about at the expense of both the single-family and the apartment sector. Focusing marketing efforts for townhouses on households on the "threshold" of being able to afford single-family detached housing is further justified by the fact that 36 to 45 per cent of freehold tenure starts were in the townhouse form in 1995 and 1996 (CMHC, 1996).

The traditional image of a townhouse is a grade-related dwelling with shared vertical walls on both sides. There are, however, many interesting projects that combine the traditional townhouse form with other forms of medium-density housing. Stacked townhouses and three- to six-storey apartment buildings can incorporate townhouse units into the ground and second floors. Such a project can thus offer a wider range of dwelling types to a range of household types while maximizing the benefit of having the most widely accepted medium-density housing form as a part of the development. The appeal of such "hybrid" developments, as illustrated in prototypes A and B, is that they can reduce the risk of a higher-density project by including the popular townhouses in the mix.

## Attributes and Limits Critical for Success

To satisfy market expectations normally associated with single-family detached housing, projects must adopt popular medium-density forms that incorporate design attributes deemed positive by prospective purchasers. These attributes are discussed in detail below.

### Ambience

*Building type*

To maintain and enhance the compatibility of medium-density housing with its surroundings, the buildings should reflect adjacent built forms as closely as possible. Larger projects can provide a transition within an existing context such as a stepped building that links a low-density neighbourhood with a main street. The preferred building forms are the townhouse, stacked townhouse, other forms of semi-attached dwellings and lowrise apartment building (four to six storeys).

*Site plan*

Site plans for medium-density developments should reinforce the surrounding streetscapes with architectural form and layout. Clarity of access for vehicles and pedestrians is critical. The site plan should provide for the security and individual identity of residents. Clear transitions from public to semi-public to semi-private to private spaces should be provided, using devices such as fences and gates, while maintaining passive security by enhancing overlooks for public areas ("eyes-on-the-street") from individual units. Wherever possible, semi-private common green spaces should be provided as part of the development, and as a target, 50 per cent of the site should be landscaped.

*Relationship to context*

The developments should utilize materials, architectural vocabulary, detailing and proportions that are in harmony with the surrounding community. In addition, community planning priorities, such as streetscape design, view corridors and heritage features should be reflected in the design.

*Security*

In terms of personal safety, active and passive security measures must be in place and visible in order to protect residents and identify potential intruders. Areas of higher risk, such as shared parking garages, should be specially addressed. Good lighting (both natural and artificial) and security alarm systems are necessary, along with

good visibility and sight lines. These features must be clearly highlighted and explained since (as the focus groups revealed) consumers do not easily comprehend the extent of the security measures from drawings or verbal descriptions alone. Uncertainty regarding security issues can negatively affect buying decisions over most other factors.

## The Immediate Territory

### Activities and services

*Mixed-use development*

If retail, commercial or live-work units are included within the development, these components must be designed so prospective purchasers do not perceive negative impact on either security or the residential image of the development. This could be achieved in part by a clear separation between entrances and parking. Further, ceiling heights must be adequate to accommodate the requirements of non-residential uses which would typically be 3 m to 4 m clear. This extra height will also enhance the amenity of these spaces when used for housing.

*Neighbourhood amenities*

Convenient access to a variety of community amenities (such as schools, playgrounds and child care) and shopping is an advantage. Availability of such amenities will impact the success of marketing a multiple housing development.

*Outdoor spaces*

Shared indoor amenity spaces should be provided for nonfreehold developments (at a minimum rate of 1 $m^2$ per unit), but public access should be controlled so as not to compromise the residents' sense of security. Overall landscaped areas provided (including private, semi-public and public areas) should equal 50 per cent of the total lot area. Access should also be controlled to semi-public and private spaces within these areas to encourage their use and control by residents.[3]

The provision of quality, private outdoor spaces is critical to the success of medium-density developments. All units must have reasonably sized private outdoor areas (a minimum of 15 $m^2$ when there are balconies, terraces or other secure outdoor spaces adjacent to the dwelling unit) over which they have control. When backyards can be provided, it is recommended that they be a minimum of 22 $m^2$. These should be designed to ameliorate extreme summer and winter weather conditions (via partial covering and shading). The ability to have one's own garden plot in particular is viewed as a primary contributor to residents' sense of control and self-expression.

### Individuality

*Image of the building*

A successful multiple housing development avoids the anonymity and scale of typical contemporary higher-density projects. Higher densities developed at a lowrise scale (maximum four to six storeys in height) create an image to which residents and the community can comfortably relate. One approach could feature grade-related suite entrances and townhouses or stacked townhouses grouped to look like large houses. Such housing forms address the emotional need for individual identity and expression and also allow for modification by owners in harmony with the overall development.

The use of local traditional materials and architectural vocabulary, including brick, large areas of glazing and sloped roofing, creates lively facades that also enhance the image of the development in the community.

*Image of the unit*

The ability to identify clearly one's own dwelling unit among the others and to make modifications to the suites that will enhance the units' individuality without detracting from the quality of the overall community are important to prospective purchasers. Garden plots in particular nurture a sense of individuality and control.

Dwelling units can be made more readily recognizable from the exterior by devices such as glazing patterns and the patterns of private outdoor spaces, which help to express the individual suites. The richness of articulating the building elevation and massing also help to give individual residents a sense of their "place" in the building. A good example of this is Prototype B.

**Movement to and from the dwelling unit**

*Relationship to street*

Designs should establish a clear relationship between the front door and the street, mediated by a zone under the exclusive control of the resident. Porches and front yards, alcoves in public corridors and courtyards enhance this relationship.

*Parking*

Convenient and secure vehicular access to the parking area and as short and secure a route as possible from the parking area to the unit should be provided. Where shared parking is necessary, lockable private parking spaces could be considered, along with direct access from the garage to the unit where possible. Common lobbies should be glass enclosed to enhance visibility.

The number of parking spaces provided will depend on demand, based on a variety of factors, including target households and the availability of convenient and dependable public transit nearby. Parking areas should be designed to allow for conversion to other uses if the demand for parking spaces decreases over time. Prototype B offers atgrade parking with opportunities to convert portions of the space to amenity or commercial uses.

Typically, parking should be provided at a ratio of approximately one space per unit for urban sites and 1.25 spaces per unit for suburban sites, which would include spaces for residents and visitors. The amount of parking provided should encourage the use of mass transit in lieu of automobile ownership, while still allowing the development to meet the expectations of purchasers with automobiles. To further promote residents' use of public transportation, parking could be sold separately from the units.

## The Dwelling Unit

**Size**

*Target households*

The townhouse form is attracting a growing share of the medium-density housing market, spurred, in part, by the increase in the proportion of non-traditional households, especially lone-parent households and couples without children. In response to this diversity, a wide variety of suite layouts can be accommodated in a single new development. This diversity should include designs for live-work occupancies as well as units to meet the needs of seniors, small families and "mingles" (unrelated singles sharing accommodation in a single unit).

*Unit size*

Consumers prefer larger units, both in total floor area and in the number of rooms. Rather than having all units of similar size, developments should offer a broader range of unit sizes and also provide amenities, efficiency and adaptability as suite features.

To the greatest extent possible, units should be designed as modules to allow flexibility to combine two or more units (vertically or horizontally), to subdivide units into smaller, independent suites and to rearrange layouts (varying the number and/or size of rooms) to suit the changing needs of residents.

*Mix of units and unit size*

Unit modules should be initially offered in three size ranges: 60 to 80 $m^2$ (traditionally equal to one- or two-bedroom sizes); 90 to 110 $m^2$ (traditional two- or three-bedroom sizes); 120 to 150 $m^2$ and up (traditional three- or four-bedroom sizes and larger).

*Layouts*

Views and natural light should be maximized through large windows, orientation and views in more than one direction.

*Amenities*

The following key features sought by prospective purchasers of medium-density housing should be incorporated into the unit plans of the prototypes, wherever possible, in order to make them competitive with single-family detached housing:

- powder room at suite entrance;
- main floor insuite laundry facilities;
- eat-in kitchen;
- family room and/or den separate from the common/living area (in larger suites);
- storage space (secure, within the building); and
- hobby area/workshop (secure, within the building).

*Efficiency*

Efficient unit layouts can overcome some of the drawbacks of space limitations. Minimizing circulation space (corridors), creating multi-purpose flexible spaces and the provision of clear sight lines through the unit and to the private outdoor space (particularly from the kitchen) will enhance the utility of the unit, particularly for households with children, when compared with single-family detached dwellings.

## New Features to Enhance the Project

Housing today is marketed primarily on the basis of location and size (unit area). The "value" of the housing is discussed only in terms of cost per square metre. Successful and innovative medium-density projects address these issues directly, while also offering distinguishing features to meet the needs of a particular target market. This section presents four additional categories of features that entice high risk/benefit purchasers away from buying single-family detached houses.

*Adaptability*

- Ease of converting spaces within the dwelling unit to other uses enhances the value of the dwelling. This includes being able to accommodate a variety of furniture layouts and the provision of space for non-residential uses. Consumers view the ability to adapt the layout of the dwelling to changing family circumstances as an attractive attribute, allowing them, if they choose, to stay in the unit through changing life situations and avoid the costs and upheaval of purchasing a new unit and moving.

- Structural systems that enhance adaptability include reinforced concrete columns and slabs and longspan manufactured wood beams which eliminate internal structural walls. Strategic placement of service chases and demising walls between suites also allows greater freedom in removing or relocating walls.

- Care in locating electrical and telecommunications outlets allows for erection or removal of portions of walls to create alternative uses of space and flexibility in locating furniture.

- Large entrance vestibules enhance privacy and accommodate the needs of older and younger children, seniors, persons requiring assisted living and mingles.

- Two recent studies by CMHC (1995, 1997) provide valuable strategies for adaptability in building design.

*Dwelling customization*

- A corollary to adaptability, customization offers purchasers in new developments the opportunity to design their unit to suit their requirements before completion of construction. While most builders offer new purchasers a selection of interior finishes, the opportunity for "individual expression" is perceived to be lacking in multiple housing. Measures to enhance the perception of participation in the design (whether choosing from alternate layouts or working with the project designer and builder to modify the standard plans to meet purchasers' needs) will contribute to the success of marketing the development.

- In some countries (for example, Israel and Switzerland), it is common practice for purchasers of lowrise multiple housing to

buy a "shell" and then design the interior space to suit their individual needs. Two recent prototypes of customization were demonstrated: in Canada, the "Grow Home" (designed by Professor Avi Friedman and students of the "Affordable Homes" masters program at McGill University) and in Osaka Japan, "Next 21." The latter project creates a structural, mechanical and electrical mid-rise multiple housing frame into which individual dwellings in a wide range of forms can be inserted.[4]

**Environment**

- Consumers respond positively to issues related to minimizing environmental impact including the reduction of energy consumption and household waste. Two challenges for the housing developer are to provide higher levels of environmental performance without increasing the purchase price of the dwelling and to provide energy and waste reduction features that are easy to use.

- Canada's R2000 program for energy-efficient, lowrise construction was successful because of coordinated marketing efforts of public and private interests. Consumers were prepared to pay a reasonable premium for the energy savings upgrades because they could readily understand the benefits of these features in both operating costs and increased occupant comfort. As a result, R2000 homes are perceived to be superior quality homes. Features that go beyond R2000 (or the C2000 program, which primarily has targeted commercial buildings) should also be promoted as creating dwellings of superior quality.

- Another supportive development is the growth of energy savings companies (ESCOs) that, in simple terms, finance the capital cost of the upgrades to the electrical, heating and cooling plants and realize a return on their investment through the savings on the operating costs of the building. This approach to energy conservation will become even more relevant and practical with deregulation in the energy supply industry, and could result in lower capital costs, enhancing the affordability of medium-density housing.

- Similar developments in the waste handling industry, such as true cost or "pay per bag" systems of payment, will also encourage more environmental responsibility among consumers. These will result in changes to building design, including provisions for handling and storing waste, increased use of composting and more recycled materials.

**Amenity spaces**

- Common amenity spaces generally receive an ambivalent reaction from prospective purchasers, because they tend to be poorly designed "all-purpose" areas which, ironically, usually sit empty and unused, yet result in increased condominium maintenance fees. Consumers express interest in more focused types of amenity spaces, which enhance the function and enjoyment of having a dwelling in their condominium (shared amenity spaces do not apply to freehold housing). These types of amenity spaces could include:

    - support facilities for home offices (i.e., business meeting rooms, shared office equipment);
    - a large dining room for private functions (i.e., a modified form of hotel amenities);
    - a guest suite (i.e., a modified form of hotel amenities); and
    - a workshop (i.e., a space to pursue hobbies with lockable storage for personal equipment).

**Limits**

The research suggests that there are certain design thresholds that should not be exceeded if medium-density housing is to satisfy consumer expectations. While the thresholds may differ from market to market (expectations of scale, price and density, for example, may be different in Ottawa and New York City), housing providers should identify and recognize these thresholds and incorporate them into their design criteria.

*Scale (including size, height and massing)*
The development must be appropriate to the site and its context, but research shows that to compete with single-family detached dwellings and appeal to the broadest range of high risk/benefit purchasers, the building should be "grade-related." Of particular importance are clear sight lines between the street and the windows, balconies, doors and porches of the building. In terms of massing, buildings should be articulated with house-like forms and proportions. A maximum of four storeys is recommended but, in certain cases, this can increase to six storeys.

*Price (and perceived value)*
Purchase price of the dwelling must be competitive with other available options, both new construction and existing stock. Purchase price is typically more important to purchasers than operating costs. Elsewhere in this report, recommendations are offered for ways to lower purchase price while improving operating costs, such as allowing ESCOs to purchase and operate the energy systems in the project.

*Density*
The research has demonstrated that the attributes considered desirable for multiple housing become more difficult to achieve above certain densities. Net densities between 12 and 36 units per acre (30 to 90 units per hectare) allow for the attributes necessary to compete with single-family detached housing and still represent a sufficient increase from today's development norms to achieve the objective of making our cities more compact. Note that street-related townhouses average 12 to 14 units per acre (30 to 35 units per hectare) and stacked townhouses can average 25 to 40 units per acre (63 to 100 units per hectare).

## Removing Barriers to a Fair Promotion of Medium-density Housing

This study shows that there is a broadbased market for medium-density housing, including a segment of the market which would normally be drawn to lower-density housing that could be attracted to medium-density forms. The focus of the report is on the design and marketing of such housing forms.

However, on a cost per square metre analysis, the detached suburban dwelling will continue to be perceived as superior value to medium-density forms because of the relatively higher cost of developing and building multiple dwellings, in particular, those of urban in-fill sites.

Municipalities which are committed to increasing densities must understand the existing barriers to the development of medium-density housing. Development cost charge schedules, property taxes, land use and transportation planning policies, growth management strategies and housing finance and mortgage insurance practices should be subjected to an "environmental accounting" analysis. When these costs are apportioned to single-family and multiple dwellings in a manner reflective of the true costs of the supporting infrastructure, multiple housing can gain a pricing edge sufficient to encourage increased densities in urban development.

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# ENDNOTES

1. The component studies to this larger study were carried out by Professors Hok-Lin Leung (Focus Group data) and Andrejs Skaburskis ("Demand Profiles for Higher Density Housing").

2. The issue of development charges falls outside the scope of this study and therefore is not dealt with in great detail here.

3. The common suburban standard is shown to work for medium density projects.

4. See this precedent under "The Forms of Medium Density Housing"